

Audit



Report

OFFICE OF THE INSPECTOR GENERAL

**LIVE-FIRE TEST AND EVALUATION OF
MAJOR DEFENSE SYSTEMS**

Report No. 97-214

September 9, 1997

19991012170

Department of Defense

DTIC QUALITY INSPECTED 4

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

ADL 00-01-0038

Additional Copies

To obtain additional copies of this audit report, please contact the Secondary Reports Distribution Unit of the Analysis, Planning, and Technical Support Directorate at (703) 604-8937 (DSN 664-8937) or FAX (703) 604-8932.

Suggestions for Future Audits

To suggest ideas for or to request future audits, contact the Planning and Coordination Branch of the Analysis, Planning, and Technical Support Directorate at (703) 604-8939 (DSN 664-8939) or FAX (703) 604-8932. Ideas and requests can also be mailed to:

OAIG-AUD (ATTN: APTS Audit Suggestions)
Inspector General, Department of Defense
400 Army Navy Drive (Room 801)
Arlington, Virginia 22202-2884

Defense Hotline

To report fraud, waste, or abuse, please contact the Defense Hotline by calling (800) 424-9098; by sending an electronic message to Hotline@DODIG.OSD.MIL; or by writing to the Defense Hotline, The Pentagon, Washington, D.C. 20301-1900. We fully protect the identity of each writer and caller.

Acronyms

| | |
|-------|---|
| CAE | Component Acquisition Executive |
| DAE | Defense Acquisition Executive |
| DOT&E | Director, Operational Test and Evaluation |
| IDA | Institute for Defense Analyses |
| LFT&E | Live-Fire Test and Evaluation |
| VV&A | Verification, Validation, and Accreditation |



**INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
400 ARMY NAVY DRIVE
ARLINGTON, VIRGINIA 22202-2884**



September 9, 1997

**MEMORANDUM FOR ASSISTANT SECRETARY OF THE NAVY (FINANCIAL
MANAGEMENT AND COMPTROLLER)
ASSISTANT SECRETARY OF THE AIR FORCE
(FINANCIAL MANAGEMENT AND COMPTROLLER)
DIRECTOR, OPERATIONAL TEST AND EVALUATION
AUDITOR GENERAL, DEPARTMENT OF THE ARMY**

**SUBJECT: Audit Report on Live-Fire Test and Evaluation of Major Defense Systems
(Report No. 97-214)**

We are providing this audit report for review and comment. The Navy did not respond to a draft of this report; however, we considered comments from the Director, Operational Test and Evaluation; the Director, Test, Systems Engineering and Evaluation; the Army; and the Air Force in preparing this final report.

DoD Directive 7650.3 requires that all recommendations be resolved promptly. Because the Navy did not comment on the draft report, we request that the Navy provide comments on this final report by November 10, 1997. If Navy comments on the draft report are received in the interim, we will consider them to be the Navy reply to the final report, unless informed otherwise.

Management comments should indicate concurrence or nonconcurrence with each applicable finding and recommendation. Comments must describe actions taken or planned in response to agreed-upon recommendations and provide the completion dates of the actions. State specific reasons for any nonconcurrence and propose alternative actions, if appropriate.

We appreciate the courtesies extended to the audit staff. Questions on the audit should be directed to Mr. John E. Meling, Audit Program Director, at (703) 604-9091 (DSN 664-9091) (jmeling@dodig.osd.mil) or Mr. Jack D. Snider, Audit Project Manager, at (703) 604-9087 (DSN 664-9087) (jsnider@dodig.osd.mil). See Appendix I for the report distribution. The audit team members are listed inside the back cover.

Robert J. Lieberman
Assistant Inspector General
for Auditing

Office of the Inspector General, DoD

Report No. 97-214
(Project No. 6AE-0067.00)

September 9, 1997

Live-Fire Test and Evaluation of Major Defense Systems

Executive Summary

Introduction. The DoD defines live-fire test and evaluation (LFT&E) as full-up (fully loaded or equipped), system-level survivability or lethality testing of a covered system, major munitions program, or missile program before the program can proceed beyond low-rate initial production. Section 2366 of title 10, United States Code, defines a covered system as any vehicle, weapon platform, or conventional weapon system that includes features designed to provide some degree of protection to users in combat and that is a major system.

Audit Objectives. The primary audit objective was to evaluate the DoD implementation of live-fire testing requirements for major Defense systems in Section 2366 of title 10, United States Code. We also evaluated the management control program as it related to our audit objective.

Audit Results. Overall, the Office of the Secretary of Defense and the Military Departments effectively implemented the LFT&E process for the programs reviewed. However, four areas required administrative improvements to make resources available for higher priority LFT&E oversight requirements.

- o The Office of the Director, Operational Test and Evaluation (DOT&E), and the Military Departments did not establish fully effective procedures to correctly identify, document, and place all LFT&E candidate systems on the annual test and evaluation oversight list. As a result, DOT&E did not have assurance that the annual test and evaluation oversight list was complete and that the Military Departments performed LFT&E testing for those systems subject to LFT&E requirements that were not on the oversight list (Finding A).

- o The DOT&E could further streamline the LFT&E reporting process resulting in better use of support contractor resources to perform other unfulfilled LFT&E oversight requirements (Finding B).

- o For 3 of 13 major systems reviewed, program offices did not process requests for waiver from full-up, system-level survivability or lethality tests in a timely manner. Further, DoD policy for processing requests for waiver from full-up, system-level survivability or lethality tests was not consistent. Delays in submitting and approving a request for waiver increase the risk that program offices will not have sufficient LFT&E results available before the program full-rate production decision, causing decisionmakers to postpone the full-rate production decision, the Military Departments to slip the release of the system to the user, and the program costs to increase (Finding C).

- o The LFT&E Office did not document LFT&E administrative policies and procedures and did not establish procedures for maintaining files to support conclusions and recommendations made on individual LFT&E programs. As a result, LFT&E

action officers did not have information needed to perform their job responsibilities most efficiently, did not maintain consistent and complete LFT&E program files, and could not transfer LFT&E oversight responsibilities to new LFT&E action officers in the most orderly manner (Finding D).

Recommendations in this report, if implemented, will improve the DoD live-fire test and evaluation process and correct the material management control weaknesses identified in the report (Appendix A).

Summary of Recommendations. We recommend using Military Department Acquisition Category II and III program lists to help identify systems subject to LFT&E requirements, providing a draft of the test and evaluation oversight list to the Military Departments for review and comment, and eliminating the Institute for Defense Analyses formal LFT&E technical report requirement. We also recommend revising DoD guidance to establish a consistent policy for submitting requests for waiver from full-up, system-level survivability or lethality testing and finalizing the "Director, Operational Test and Evaluation, Notebook." Further, we recommend formal documentation and recommendation of LFT&E candidate systems. We also recommend submitting requests for waiver from full-up, system-level survivability or lethality testing for certain systems. Additionally, we recommend placing a list of Navy Acquisition Category II and III programs on the Internet.

Management Comments. The Assistant Secretary of the Navy (Research, Development and Acquisition) and the Director, Navy Test and Evaluation and Technology Requirements, did not respond to a draft of this report. However, we received comments on a draft of this report from the Director, Operational Test and Evaluation; the Deputy Under Secretary of the Army (Operations Research); and the Principal Deputy, Assistant Secretary of the Air Force (Acquisition). The Director, Operational Test and Evaluation, fully or partially concurred with the findings and concurred with the recommendations or provided acceptable alternative corrective action. The Deputy Under Secretary of the Army concurred with the findings and recommendations. The Principal Deputy concurred with the recommendations addressed to the Air Force and provided comments concerning the B-2 bomber. Although not required to comment, the Director, Test, Systems Engineering and Evaluation, and the Director, Air Force Test and Evaluation Directorate, provided comments addressing the findings, recommendations, and specific aspects of the report. See Part I for a summary of management comments responding to the recommendations, Part II for our response to the management comments addressing specific text in the report, and Part III for the complete text of management comments.

Audit Response. The Director, Operational Test and Evaluation; the Deputy Under Secretary of the Army (Operations Research); and the Principal Deputy, Assistant Secretary of the Air Force (Acquisition), comments were responsive to our recommendations. Therefore, no additional comments are required from those individuals in response to this report. However, because the Assistant Secretary of the Navy (Research, Development and Acquisition) and the Director, Navy Test and Evaluation and Technology Requirements, did not respond to a draft of this report, we request that they provide comments on this final report by November 10, 1997.

Table of Contents

| | |
|--------------------------|---|
| Executive Summary | i |
|--------------------------|---|

Part I - Audit Results

| | |
|---|----|
| Audit Background | 2 |
| Audit Objectives | 2 |
| Live-Fire Test and Evaluation Generally Well Managed | 3 |
| Finding A. Live-Fire Test and Evaluation Oversight List | 5 |
| Finding B. Reporting Live-Fire Test and Evaluation Results | 14 |
| Finding C. Processing Requests for Waiver From Full-Up, System-Level Survivability or Lethality Tests | 21 |
| Finding D. Strengthening Management Controls | 30 |

Part II - Additional Information

| | |
|---|----|
| Appendix A. Audit Process | |
| Scope and Methodology | 36 |
| Management Control Program | 38 |
| Matter of Concern | 39 |
| Appendix B. Summary of Prior Coverage | 41 |
| Appendix C. Section 2366 of Title 10, United States Code | 43 |
| Appendix D. Definitions of Technical Terms | 45 |
| Appendix E. Audit Response to Air Force Specific Comments Concerning the Report | 49 |
| Appendix F. Live-Fire Test and Evaluation Reporting and Oversight Process | 52 |
| Appendix G. Director, Operational Test and Evaluation, Live-Fire Test Reports to Congress | 55 |
| Appendix H. Description of Major Defense Systems Reviewed | 58 |
| Appendix I. Report Distribution | 60 |

Part III - Management Comments

| | |
|--|----|
| Director, Operational Test and Evaluation, Comments | 64 |
| Director, Test, Systems Engineering and Evaluation, Comments | 68 |
| Department of the Army Comments | 69 |
| Department of the Air Force Comments | 70 |

Part I - Audit Results

Audit Background

Section 2366 of title 10, United States Code, "Major systems and munitions programs: survivability and lethality testing required before full-scale production," requires the Secretary of Defense to provide that a covered system, a major munitions program, or a product improvement to a covered system or major munitions program not proceed beyond low-rate initial production until:

- o the completion of realistic (full-up,¹ system-level) survivability or lethality testing of the system or program, as applicable; and

- o the Secretary has reported the results of such testing to Congress along with the Secretary's overall assessment of that testing.

Section 2366 of title 10, United States Code, defines a covered system as any vehicle, weapon platform, or conventional weapon system that includes features designed to provide some degree of protection to users in combat and that is a major system. Realistic survivability testing is testing for vulnerability of a covered system, or product improvement to a covered system, in combat by firing munitions likely to be encountered in combat (or munitions with similar capability) at the system configured for combat, with the primary emphasis on testing vulnerability with respect to potential user casualties and taking into equal consideration the susceptibility to attack and combat performance of the system. Realistic lethality testing is testing to determine the lethality of a major munitions program, missile program, or a covered product improvement program by firing the munition or missile concerned at appropriate targets configured for combat. Appendix C provides the text of Section 2366 of title 10, United States Code, and Subsection 2302(5) of title 10, United States Code, that Section 2366 references. Appendix D provides definitions of technical terms used in this report.

Audit Objectives

The primary audit objective was to evaluate the effectiveness of the DoD implementation of live-fire testing requirements for major Defense systems in Section 2366 of title 10, United States Code. Specifically, we evaluated whether live-fire tests and evaluations provided timely and reasonable assessments of the survivability and lethality of covered systems as they progressed through the development phase before the full-rate production decision. Where the milestone decision authority waived the use of full-up, system-level survivability or lethality tests, we evaluated whether the milestone decision authority properly made the determination before the engineering and

¹DoD defines a full-up live-fire test as a vulnerability test of a complete or partial system loaded or equipped with all dangerous materials, including flammables and explosives, that would normally be on board in combat.

manufacturing development decision that survivability and lethality tests of a system were unreasonably expensive and impractical and identified acceptable alternative survivability or lethality tests. We also evaluated whether the survivability and lethality tests were adequately planned, conducted, and reported to Congress as required. Further, we evaluated the management control program as it related to our audit objective. In Appendix A, we discuss the scope and methodology used to accomplish the objectives as well as management controls and another matter of concern. In Appendix B, we summarize prior coverage.

Live-Fire Test and Evaluation Generally Well Managed

Overall, the Office of the Secretary of Defense and the Military Departments effectively implemented the LFT&E process for the programs reviewed. In fact, after the Federal Acquisition Streamlining Act of 1994 transferred responsibility for monitoring and reviewing live-fire actions from the Office of the Director, Test, Systems Engineering and Evaluation, to the Office of the Director, Operational Test and Evaluation (DOT&E), DOT&E combined operational test and evaluation and LFT&E congressional reporting requirements into a single report, the combined beyond low-rate initial production and live-fire report. Combining the reports has made for a more streamlined and effective presentation of operational test and LFT&E results to Congress and DoD management.

The DOT&E Live Fire Test and Evaluation Office has also employed a number of creative innovations to improve awareness of the LFT&E process. For example, the Office has written a number of papers, conducted LFT&E educational conferences, and established an Internet website² to inform individuals involved in LFT&E about the latest LFT&E advancements, guidance, and issues.

Based on the programs reviewed during the audit, the Military Departments adequately planned and conducted survivability and lethality tests and effectively executed LFT&E strategies and plans with appropriate DOT&E oversight. For 10 of the 13 programs reviewed, the Military Departments spent less than 0.3 percent of a program's total research, development, test, and evaluation and procurement funding on LFT&E.

For 19 of the 26 models associated with the programs reviewed, the respective Military Departments were planning to verify, validate, and accredit the models before using them for live-fire survivability or lethality analyses. However, for the seven remaining models, the Office of the Secretary of Defense and the Military Departments did not plan to verify, validate, and accredit the models. Nonetheless, the responsible Military Department should have conducted

²World-Wide Website [<http://www.dote.osd.mil/lfte/INDEX.HTML>] contains information on the DOT&E live-fire test and evaluation program.

VV&A of the models. Without the Military Departments conducting the VV&A, the models may not accurately represent the developer's conceptual description and specifications and may not be an accurate representation of real-world results (Appendix A). Unrelated to the VV&A of the systems reviewed, four areas required administrative improvements to make resources available for higher priority LFT&E oversight requirements. A discussion of the associated findings follows.

Finding A. Live-Fire Test and Evaluation Oversight List

The DOT&E and the Military Departments did not establish fully effective procedures to correctly identify, document, and place all LFT&E candidate systems on the annual test and evaluation oversight list. The DOT&E and Military Department procedures were not fully effective because:

- o Military Departments did not have documentation showing that they recommended systems to DOT&E as LFT&E candidates,

- o DOT&E did not routinely use Military Department Acquisition Category II and III program lists to identify systems subject to LFT&E requirements in preparing the annual test and evaluation oversight list,

- o DOT&E did not provide a draft of the test and evaluation oversight list to the Military Departments for review and comment before issuing the annual test and evaluation oversight list, and

- o DoD acquisition policy did not address LFT&E requirements for systems with commercial and nontraditional acquisition strategies.

As a result, DOT&E did not have assurance that the annual test and evaluation oversight list was complete and that the Military Departments performed LFT&E testing for those systems subject to LFT&E requirements that were not on the oversight list.

Live-Fire Test and Evaluation Requirements and Guidance

Statutory Requirements. Section 139 of title 10, United States Code, "Director of Operational Test and Evaluation,"³ and Section 2366 of title 10, United States Code, establish LFT&E statutory requirements.

Section 139. Section 139 requires DOT&E to monitor and review live-fire testing actions in DoD. Section 139 also requires DOT&E to prepare an annual report summarizing the operational test and evaluation actions, including live-fire testing, of DoD during the preceding fiscal year. Further, Section 139 requires DOT&E to submit concurrently the annual report to the Secretary of Defense, the Under Secretary of Defense for Acquisition and Technology, and Congress not later than 10 days after the President submits the budget to Congress for the next fiscal year.

³Public Law 103-355, "Federal Acquisition Streamlining Act of 1994," section 3012, amended section 139.

Finding A. Live-Fire Test and Evaluation Oversight List

Section 2366. Section 2366 requires the Secretary of Defense to provide that a covered system, a major munitions program, or a product improvement to a covered system or major munitions program not proceed beyond low-rate initial production until:

- o the completion of realistic (full-up, system-level) survivability or lethality testing of the system or program, as applicable; and

- o the Secretary has reported the results of such testing to Congress along with the Secretary's overall assessment of that testing.

If the completion of realistic survivability or lethality testing is unreasonably expensive and impractical, the Secretary may waive the application of the survivability and lethality tests and instead allow alternative testing.

DoD Guidance. The DoD Regulation 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs," March 15, 1996, Appendix IV, "Live Fire Test and Evaluation Reports, Mandatory Procedures and Formats," establishes guidelines for conducting LFT&E within DoD and requires the Military Departments to recommend candidate systems for LFT&E. Further, the regulation requires DOT&E and the Director, Test, Systems Engineering and Evaluation, to jointly publish an annual test and evaluation oversight list of programs for operational, live-fire, and developmental test and evaluation oversight.

Army Guidance. Army Regulation 73-1, "Test and Evaluation Policy," February 27, 1995, requires the Deputy Under Secretary of the Army (Operations Research) to recommend candidate systems for LFT&E.

Navy Guidance. Secretary of the Navy Instruction 5000.2B, "Implementation of Mandatory Procedures for Major and Non-Major Defense Acquisition Programs and Major and Non-Major Information Technology Acquisition Programs," December 6, 1996, designates the Director, Navy Test and Evaluation and Technology Requirements, as the Navy LFT&E primary point of contact. Further, the instruction requires the developing organization to implement and coordinate LFT&E requirements.

Air Force Guidance. Air Force Instruction 99-105, "Live Fire Test and Evaluation," July 25, 1994, establishes guidance and procedures for the LFT&E of Air Force systems. The instruction requires the Assistant Secretary of the Air Force (Acquisition) to recommend candidate systems for compliance with LFT&E legislation.

Live-Fire Test and Evaluation Oversight Candidates

The DoD and Military Department LFT&E implementing guidance requires the Military Departments to recommend candidate systems to DOT&E for LFT&E;

Finding A. Live-Fire Test and Evaluation Oversight List

however, the Military Departments did not have documentation showing that they recommended systems to DOT&E as LFT&E candidates.

Army Documentation. The Office of the Deputy Under Secretary of the Army (Operations Research) did not formally document and recommend candidates for LFT&E oversight. Instead, the Office informally invited representatives from the Office of the DOT&E to attend integrated product team meetings or program briefings on those programs that the Army believed met the criteria in DoD Regulation 5000.2-R for live-fire oversight.

Navy Documentation. The Office of the Director, Navy Test and Evaluation and Technology Requirements, could not provide documentation showing that developing organizations had recommended covered systems for live-fire oversight. A representative from the Office of the Director stated that he reviewed Navy acquisition category program listings to identify potential LFT&E candidates. If a program appeared to meet the Section 2366 criteria and was not on the DOT&E live-fire oversight list, he then counseled the developing organization to nominate the program for LFT&E. However, the representative did not document the counseling.

Air Force Documentation. The Office of the Assistant Secretary of the Air Force (Acquisition) could not provide documentation showing that it had recommended systems for LFT&E oversight. The Office of the Assistant Secretary stated that it informally identified potential live-fire candidates when it reviewed program test strategies during integrated product team meetings. Operational test representatives from the Office of the DOT&E were normally present at those meetings if the program was subject to DOT&E operational test and evaluation oversight.

Annual Test and Evaluation Oversight List

The DOT&E and the Military Departments did not establish fully effective procedures to correctly identify, document, and place all LFT&E candidate systems on the annual test and evaluation oversight list. Procedures for establishing and maintaining the LFT&E section of the annual test and evaluation oversight list were not fully effective because DOT&E did not routinely use Military Department Acquisition Category II and III program lists to identify systems subject to LFT&E requirements in preparing the annual test and evaluation oversight list and did not provide a draft of the test and evaluation oversight list to the Military Departments for review and comment before issuing the annual test and evaluation oversight list. DOT&E could use the Military Department Acquisition Category II and III program lists to identify major systems and munition programs, respectively, for inclusion on its oversight list. Further, DoD acquisition policy did not address LFT&E requirements for systems with commercial and nontraditional acquisition strategies.

Finding A. Live-Fire Test and Evaluation Oversight List

Identifying Live-Fire Test and Evaluation Oversight Candidates. Each year, the Under Secretary of Defense for Acquisition and Technology publishes a major Defense acquisition programs list of Acquisition Category I programs. DOT&E updates the annual test and evaluation oversight list by using the list of Acquisition Category I programs and soliciting feedback from operational test, live-fire test, and developmental test action officers in the Offices of the DOT&E and the Director, Test, Systems Engineering and Evaluation, to determine which Acquisition Category II and III programs should be on the annual test and evaluation oversight list. DOT&E action officers solicit input from their respective Military Department counterparts for selected programs when updating the list. Based on the action officer feedback, DOT&E prepares a tentative list of test and evaluation oversight candidates. Then, DOT&E coordinates the list within his office and the Office of the Director, Test, Systems Engineering and Evaluation. After the coordination, DOT&E finalizes the list and both DOT&E and the Director, Test, Systems Engineering and Evaluation, sign the list.

Under the annual list preparation process, DOT&E cannot be certain that he has identified all Acquisition Category II and III programs that should be under LFT&E oversight. For example, DOT&E did not identify the M903 Caliber 0.50 Saboted Light Armor Penetrator Ammunition (M903) and the M430A1 40 millimeter (mm) Cartridge (M430A1) as LFT&E candidates on its annual test and evaluation oversight list. Rather, the Army notified DOT&E after performing a review of its munitions programs that those programs should be live-fire candidates. Later, DOT&E reported on those programs to Congress, in accordance with Section 2366.

Further, DOT&E did not routinely obtain lists of all Acquisition Category II and III programs from the Military Departments for review to determine whether the Military Departments had identified all LFT&E candidate programs. In discussions with DOT&E management, they agreed that obtaining a list of Military Department Acquisition Category II and III programs would be helpful in identifying LFT&E candidate programs. The Army⁴ and the Air Force⁵ already maintain program acquisition category lists on the Internet. As of August 1997, the Director, Acquisition Documentation, Office of the Assistant Secretary of the Navy (Research, Development and Acquisition), was in the process of including its program acquisition category list on the Internet. Because the Military Departments have made or are making program acquisition category lists available on the Internet, DOT&E should make maximum use of those lists to identify potential LFT&E candidates.

Reviewing and Commenting on the Test and Evaluation Oversight List. The annual test and evaluation oversight list included programs that did not belong in the LFT&E section of the oversight list, according to the

⁴World-Wide Website [<http://www.sarda.army.mil>] contains Army Acquisition Category Listing.

⁵World-Wide Website [<http://afmc.wpafb.af.mil/organizations/HQ-AFMC/DR/dri-home/pml.htm>] contains Air Force Acquisition Category Listing.

Finding A. Live-Fire Test and Evaluation Oversight List

Air Force. DOT&E action officers informally conferred with their Military Department counterparts regarding recommendations for test and evaluation oversight candidates. However, DOT&E did not provide the subsequent draft list to the Military Departments for review and comment before DOT&E and the Director, Test, Systems Engineering and Evaluation, issued their annual test and evaluation oversight list. The informal process at the action officer level could not ensure that DOT&E and the Military Departments resolved differences before DOT&E included programs on the oversight list.

Of the 74 LFT&E programs listed in the December 1996 annual test and evaluation oversight list, DOT&E annotated 4 as being "under review for live fire test." The Office of the DOT&E included those programs on the oversight list to maintain visibility pending some future decision regarding the applicability of live-fire testing. In February 1997, the Director, Air Force Test and Evaluation Directorate, identified six programs that he believed should not be in the LFT&E section of the oversight list and proposed to DOT&E the following changes:

- o remove two programs from LFT&E oversight because the LFT&E was complete and DOT&E had issued the LFT&E reports;
- o annotate another program as "under review for live-fire test";
- o remove one program from the list because it was already in production;
- o annotate one program on the list to read that the "requirements of Title 10, United States Code, Section 2366, would apply only if the program proceeded beyond low-rate [initial] production"; and
- o remove one program from the list because its system survivability was not significantly different from its predecessor system.

Because DOT&E received the Director, Air Force Test and Evaluation Directorate, comments after DOT&E published the annual oversight list, the published oversight list did not show subsequent changes resulting from discussions between DOT&E and the Director, Air Force Test and Evaluation Directorate, concerning those comments.

Addressing Commercial and Nontraditional Acquisition Strategies. Section 2366 does not specifically address the application of LFT&E requirements for commercial acquisitions or acquisitions that do not follow the milestone-based acquisition process. Consequently, the Office of the Secretary of Defense and the Military Departments have the flexibility to tailor their conduct and oversight of the LFT&E process for commercial and nontraditional acquisitions because those acquisitions generally do not follow the milestone-based acquisition process, the manufacturer has stabilized the product design before the Office of the Secretary of Defense and the Military Departments acquire the item, and the item may already be in production before DOT&E and the Military Departments have identified the item as a potential live-fire candidate. The Office of the DOT&E and the Military Departments have

Finding A. Live-Fire Test and Evaluation Oversight List

discussed in great detail whether programs with commercial and nontraditional strategies should be subject to LFT&E oversight. As of August 1997, the Office of the Secretary of Defense was considering a revision to DoD Regulation 5000.2-R to require commercial items, including commercial off-the-shelf items, nondevelopmental items, and advanced concept technology demonstrators or prototypes that meet the definition of a covered system or major munitions program to be subject to LFT&E. Therefore, this report makes no recommendation to address the issue.

Effect on Managing Live-Fire Test Oversight

By not obtaining and reviewing a complete list of all Acquisition Category II and III programs, DOT&E did not have assurance that all programs subject to LFT&E requirements were in the LFT&E section of the annual test and evaluation oversight list and that Military Departments performed appropriate LFT&E for those programs that were not on the oversight list. In addition, because the Military Departments did not formally document and recommend candidate programs for LFT&E oversight, DOT&E unnecessarily spent time obtaining information on those programs from other unofficial or indirect sources. Further, by not providing the oversight list to the Military Departments for review and comment, DOT&E included programs that may not belong on the oversight list that DOT&E submitted to the Secretary of Defense, the Under Secretary of Defense for Acquisition and Technology, and Congress for program oversight purposes.

Conclusion

To ensure that the Office of the DOT&E oversees all acquisition programs subject to LFT&E requirements, it should obtain and review Military Department acquisition category program lists when preparing the annual test and evaluation oversight list. The routine sharing of on-line information within the DoD acquisition community is essential for enhanced teamwork and for less intrusive oversight envisioned under acquisition reform. To further enhance the oversight process, DOT&E should provide the Military Departments with the opportunity to formally comment on programs identified for oversight and to consider those comments as appropriate before issuing the annual test and evaluation oversight list, and the Military Departments should formally document and recommend candidate programs for LFT&E oversight.

Management Comments on the Finding and Audit Response

The Director, Operational Test and Evaluation, commented on the finding. The following discussion is a synopsis of those comments and the audit response. The Principal Deputy, Assistant Secretary of the Air Force (Acquisition), and

Finding A. Live-Fire Test and Evaluation Oversight List

the Director, Air Force Test and Evaluation Directorate, also provided specific comments on the report. See Appendix E for a summary of those comments and the audit response. The complete texts of those comments are in Part III.

Director, Operational Test and Evaluation, Comments. The Director partially concurred with the finding. He commented on the maintenance of the annual test and evaluation oversight list and the difficulty associated with determining the candidacy of systems for test and evaluation oversight. He stated that DoD Regulation 5000.2-R requires the Military Departments to identify potential systems for LFT&E oversight. He agreed that the identification of potential LFT&E systems was not uniformly implemented with the Military Departments. Further, he stated that DoD Regulation 5000.2-R explicitly gives DOT&E the responsibility to approve LFT&E candidate systems for oversight. He noted that the identification of LFT&E candidates, especially for Acquisition Category II and lower category programs, has not been efficient. Further, he noted that his office has had to rely on any number of sources to obtain information to identify potential candidates when the Military Department have not nominated LFT&E candidates systems.

Audit Response. We agree with the Director, Operational Test and Evaluation, comments.

Recommendations, Management Comments, and Audit Response

A.1. We recommend that the Assistant Secretary of the Air Force (Acquisition); the Deputy Under Secretary of the Army (Operations Research); the Director, Navy Test and Evaluation and Technology Requirements, formally document and recommend candidate systems to the Director, Operational Test and Evaluation, for LFT&E oversight.

Deputy Under Secretary of the Army (Operations Research) Comments. The Deputy Under Secretary concurred with the recommendation, stating that the Army would join in whatever procedure that DOT&E established for the action.

Principal Deputy, Assistant Secretary of the Air Force (Acquisition), Comments. The Principal Deputy concurred with the recommendation, stating that, although Air Force Instruction 99-105, "Live Fire Test and Evaluation," July 25, 1994, provides guidance and procedures for the LFT&E of Air Force systems, the instruction does not provide specific guidance on identifying candidate systems. Consequently, the Principal Deputy stated that the Air Force Test and Evaluation Directorate and the Office of the Assistant Secretary of the Air Force (Acquisition) would update the instruction to provide specific guidance concerning the systematic documentation and recommendation of Air Force candidate systems. The Principal Deputy estimated that the update would be completed by April 1998.

Finding A. Live-Fire Test and Evaluation Oversight List

Director, Navy Test and Evaluation and Technology Requirements, Comments. The Director did not comment on the recommendation. We request that the Director provide comments in response to the final report.

Director, Operational Test and Evaluation, Comments. Although not required to comment, the Director agreed that the Military Departments should comply with current DoD regulations requiring the Military Departments to nominate potential candidates for LFT&E consideration.

Director, Air Force Test and Evaluation Directorate, Comments. Although not required to comment, the Director agreed with the recommendation.

A.2. We recommend that the Director, Operational Test and Evaluation:

a. Use Military Department Acquisition Category II and III program lists to help identify systems subject to live-fire test and evaluation requirements in preparing the annual test and evaluation oversight list.

Director, Operational Test and Evaluation, Comments. The Director concurred with the recommendation, stating that the Military Departments should provide Acquisition Category II and III program lists to his office on a regular basis for review.

Director, Test, Systems Engineering and Evaluation, Comments. Although not required to comment, the Director agreed with the recommendation.

Director, Air Force Test and Evaluation Directorate, Comments. Although not required to comment, the Director, Air Force Test and Evaluation Directorate, stated that he did not believe that a review of Acquisition Category III program lists would help identify LFT&E candidate systems subject to Section 2366 of title 10, United States Code. However, he did agree with the use of Acquisition Category II program lists to identify candidate systems. He stated that Section 2366 describes the systems that are subject to LFT&E and specifically addresses Acquisition Category I and II programs. He further stated that, according to the definition of "covered system" in Subsection 2366(e)(1), only Acquisition Category I and II programs are covered. He stated that Acquisition Category III programs are not potential LFT&E candidates and are not subject to Office of the Secretary of Defense LFT&E oversight.

Audit Response. Acquisition Category III programs could be subject to LFT&E oversight when they include major munitions programs or product improvements to a covered system or a major munitions program or a missile program that is likely to affect significantly the survivability or lethality of the applicable system, munition, or missile produced under the program.

Subsection 2366(e)(2) of title 10, United States Code, states that a major munitions program is a munitions program for which DoD plans to acquire more than one million rounds or a conventional munitions program that is a major system. Consequently, a munitions program for more than a million rounds of munitions would probably not be a major system; however, it could

Finding A. Live-Fire Test and Evaluation Oversight List

be subject to LFT&E oversight, such as the M903 Caliber 0.50 Saboted Light Armor Penetrator Ammunition (M903) and the M430A1 40 mm Cartridge (M430A1), as noted in this finding.

Subsection 2366(e)(6) of title 10, United States Code, states that a covered product improvement program is a modification or upgrade to a covered system or to a major munitions program or a missile program that the Secretary of Defense has determined will likely affect significantly the survivability or lethality, respectively, of the system or of the munition or missile produced under the program. Consequently, an Acquisition Category III product improvement to a covered system or a major munitions program or a missile program could significantly change the overall survivability or lethality of the applicable system, munition, or missile produced under the program and, therefore, could make the program subject to LFT&E oversight.

b. Provide a draft of the test and evaluation oversight list to the Military Departments for review and comment before issuing the annual test and evaluation oversight list.

Director, Operational Test and Evaluation, Comments. The Director concurred with the recommendation, stating that a draft of the test and evaluation oversight list should be circulated to the Military Departments for their review and comment before publication.

Director, Test, Systems Engineering and Evaluation, Comments. Although not required to comment, the Director agreed with the recommendation.

Director, Air Force Test and Evaluation Directorate, Comments. Although not required to comment, the Director agreed with the recommendation.

A.3. We recommend that the Assistant Secretary of the Navy (Research, Development and Acquisition) place a list of Navy Acquisition Category II and III programs on the Internet by September 30, 1997.

Assistant Secretary of the Navy (Research, Development and Acquisition) Comments. The Assistant Secretary did not comment on the recommendation. We request that the Assistant Secretary provide comments in response to the final report.

Director, Air Force Test and Evaluation Directorate, Comments. Although not required to comment, the Director agreed with the recommendation.

Finding B. Reporting Live-Fire Test and Evaluation Results

The DOT&E could further streamline the LFT&E reporting process. Before the transfer of LFT&E oversight responsibilities to DOT&E, the Director, Test, Systems Engineering and Evaluation, reported live-fire test results and assessments to Congress based on Institute for Defense Analyses (IDA)⁶ technical reports. Since the transfer of LFT&E oversight responsibilities, DOT&E includes live-fire test results and assessments with operational test results in a DOT&E combined beyond low-rate initial production and live-fire report to Congress. However, DOT&E live-fire test management has continued to require IDA technical reports after the transfer of responsibilities. The DOT&E combined report that includes LFT&E results fulfills DOT&E live-fire and operational test reporting requirements. As a result, DOT&E could better use IDA resources to perform other unfulfilled LFT&E oversight requirements.

Live-Fire Test Reporting Requirements and Background

Statutory Reporting Requirements. Subsection 2366(d) of title 10, United States Code, "Reporting to Congress," and Subsection 2399(b) of title 10, United States Code, "Operational Test and Evaluation," establish statutory requirements for the reporting of live-fire and operational test results to Congress.

Subsection 2366(d). Subsection 2366(d) requires that, at the conclusion of survivability or lethality testing for covered systems and programs, the Secretary of Defense will submit a report on the testing to the congressional defense committees.⁷ The reports are to describe the results of the survivability or lethality testing and to give the Secretary's overall assessment of the testing for each system.

Subsection 2399(b). Subsection 2399(b) requires DOT&E to analyze the results of the operational tests and evaluations that a Military Department conducts for each major Defense acquisition program. At the conclusion of the testing, the Director, DOT&E, will prepare a report stating whether the test and

⁶The Institute for Defense Analyses is a federally funded research and development center that DOT&E contracts with for technical and administrative support.

⁷Subsection 2366(e)(7) of title 10, United States Code, provides that the congressional defense committees are the Committee on Armed Services and the Committee on Appropriations of the Senate, and the Committee on National Security and the Committee on Appropriations of the House of Representatives.

Finding B. Reporting Live-Fire Test and Evaluation Results

evaluation performed were adequate and whether the results of such test and evaluation confirm that the items or components actually tested are effective and suitable for combat. Subsection 2399(b) also requires DOT&E to submit the report to the Secretary of Defense, the Under Secretary of Defense for Acquisition and Technology, and the congressional Defense committees before a final decision to proceed with a program beyond low-rate initial production. The Secretary of Defense may provide comments that accompany the report to Congress.

Live-Fire Test Report Streamlining. The Federal Acquisition Streamlining Act of 1994 transferred responsibility for monitoring and reviewing LFT&E from the Director, Test, Systems Engineering and Evaluation, to DOT&E. Before the transfer of responsibility, the Director, Test, Systems Engineering and Evaluation, had contracted with IDA to provide technical support in executing live-fire test oversight and assessment. The DOT&E continues to use IDA to support its LFT&E program. Before DOT&E assumed responsibility for live-fire test oversight in January 1995, the Director, Test, Systems Engineering and Evaluation, met the congressional reporting requirements by using IDA-prepared LFT&E technical reports as the basis for its live-fire test results. However, DOT&E has since combined operational test and evaluation and LFT&E congressional reporting requirements into a single report, the combined beyond low-rate initial production and live-fire report.

DoD Reporting Requirements. The DoD Regulation 5000.2-R, Appendix IV, requires DOT&E to conduct an assessment of Military Department LFT&E programs and prepare the Secretary of Defense's LFT&E assessment report to Congress. DOT&E includes the LFT&E assessment with operational test results in the beyond low-rate initial production report if the program is also subject to operational test and evaluation oversight. Otherwise, DOT&E issues a separate report to Congress addressing live-fire test results and its assessment of those results. Further, the regulation requires the Military Departments to document the results and overall evaluation of all testing identified in the LFT&E strategy for LFT&E programs and report the results and overall evaluation to DOT&E no later than 120 days after the Military Department completes the testing. The Military Department report is to facilitate the DOT&E independent report to Congress. Appendix F discusses the LFT&E reporting and oversight process.

Live-Fire Test and Evaluation Reporting

The DOT&E could further streamline the LFT&E reporting process resulting from the transfer of LFT&E oversight responsibilities to DOT&E. The Office of the DOT&E has continued to require IDA to prepare formal technical reports for LFT&E programs. The Office should have discontinued the requirement after the Federal Acquisition Streamlining Act transferred LFT&E oversight responsibilities to DOT&E from the Office of the Director, Test, Systems Engineering and Evaluation, and after DOT&E began preparing its combined beyond low-rate initial production and live-fire reports. In preparing the

Finding B. Reporting Live-Fire Test and Evaluation Results

combined beyond low-rate initial production and live-fire reports as discussed in Appendix F, the DOT&E operational-test action officers use draft summary input on the live-fire test results and evaluation from IDA rather than the IDA-prepared technical report. From January 1995 through May 1997, DOT&E issued two beyond low-rate initial production reports that combined operational test results with live-fire test results and assessments. Those reports were the "AH-64D Longbow Apache Attack Helicopter," October 1995, and the "C-17 Globemaster III Airlift Aircraft," November 1995. In addition, DOT&E issued two other live-fire test reports for programs subject only to DOT&E live-fire oversight. Those reports were the "Live Fire Test and Evaluation of the 0.50 Caliber M903 Saboted Light Armor Penetrator (SLAP) Ammunition," September 26, 1995, and the "Live Fire Test and Evaluation Report on the M430A1 40MM Cartridge," May 30, 1996. Appendix G provides details on the four reports.

For two of the four live-fire test reports, IDA did not prepare a technical report until after DOT&E transmitted the reports to Congress.

- o For the C-17 Globemaster III airlift aircraft, an IDA technical report was not available before DOT&E transmitted its LFT&E report to Congress. IDA issued a final technical report about 5 months after DOT&E transmitted its LFT&E report to Congress.

- o For the M430A1 munition program, an IDA technical report was not available before DOT&E transmitted its LFT&E report to Congress. IDA issued its final technical report about 3 months after DOT&E transmitted its LFT&E report to Congress.

For the two remaining live-fire test reports that DOT&E submitted to Congress, IDA has yet to submit a final technical report to DOT&E.

- o For the AH-64D Longbow Apache Attack helicopter, a draft IDA technical report was available for the Longbow Apache portion of the AH-64D Program before DOT&E transmitted its LFT&E report to Congress in October 1995. IDA had not finalized its technical report on the Longbow Apache portion of the AH-64D Program as of August 1997. IDA did not prepare a technical report for the Longbow Hellfire modular missile portion of the AH-64D Program because it did not have time to prepare the report.

- o For the M903 munition program, IDA did not prepare a final LFT&E technical report because it did not have time to prepare the report.

As evidenced, DOT&E action officers were able to prepare their LFT&E reports for Congress based on summary input from IDA without needing a formal IDA technical report. In addition, DOT&E apparently does not need the formal IDA technical report, and no adverse impact resulted from not having the final technical report.

Time for Preparing Institute for Defense Analyses Reports. The IDA did not maintain records on how much time it spent on writing LFT&E technical reports. However, IDA employees estimated that writing and staffing a paper

Finding B. Reporting Live-Fire Test and Evaluation Results

for publication could take from 6 weeks to 3 months in addition to the time required to do the analysis. Because the IDA level-of-effort contract with DOT&E did not require IDA to track costs incurred, we were unable to quantify the costs of preparing IDA technical reports for LFT&E programs.

Reason for Preparing Institute for Defense Analyses Technical Reports. The Office of the DOT&E stated that it needed a formal IDA technical report to support congressional information requirements. However, as discussed earlier in this report, IDA had not finalized its technical report until after DOT&E provided its report to Congress and, in two of the four cases, had not prepared the formal technical report more than 1½ years later.

The Office of the DOT&E also stated that the Military Departments' LFT&E reports could not support the DOT&E report to Congress because the Military Departments might not be as candid or as complete in reporting unfavorable LFT&E results and because IDA often performed DOT&E-directed analyses that the Military Departments did not conduct and document in their LFT&E reports. In our opinion, by DOT&E exercising its oversight responsibilities for approving the Military Departments' LFT&E strategies, monitoring the Military Departments' live-fire tests, and reporting the live-fire test results and its assessment of those results, DOT&E has provided sufficient controls over the Military Departments to ensure that the Military Departments accurately report LFT&E results. Although IDA often performed analyses in addition to those of the Military Departments, DOT&E can use the results of those additional analyses without requiring IDA to prepare a formal technical report.

Effect of Live-Fire Test Reporting Process

By DOT&E not further streamlining the LFT&E reporting process, DOT&E was causing IDA to spend time preparing LFT&E technical reports, time which could be better spent performing other LFT&E support requirements. Those LFT&E support requirements could include overseeing joint live-fire testing, providing more in-depth oversight to covered LFT&E programs, and providing additional support to LFT&E educational conferences. The technical report preparation time could be significant because the current annual test and evaluation oversight list has 74 live-fire test programs that would benefit from eliminating the formal IDA technical report requirement.

Conclusion

To further streamline its LFT&E reporting process, DOT&E should eliminate the requirement for the IDA formal technical report. Instead of requiring the formal technical report, DOT&E should require IDA to retain its technical analysis documentation necessary to support its draft summary input on life-fire test results and evaluations included in the DOT&E combined beyond low-rate

Finding B. Reporting Live-Fire Test and Evaluation Results

initial production and live-fire reports to Congress. The elimination of the formal technical report and the retention of analyses and summary information would also apply to live-fire test reports for programs subject only to DOT&E live-fire oversight. The elimination of the formal technical report would enable IDA to better spend its time performing other unfulfilled DOT&E live-fire test and evaluation support requirements.

Management Comments on the Finding and Audit Response

The Director, Operational Test and Evaluation; the Director, Test, Systems Engineering and Evaluation; and the Director, Air Force Test and Evaluation Directorate, commented on the finding. The following discussion is a synopsis of the Director, Operational Test and Evaluation, and the Director, Test, Systems Engineering and Evaluation, comments and the audit response. The Director, Air Force Test and Evaluation Directorate, comments on the finding were similar to his comments on the recommendation; therefore, we discuss his comments on the finding along with those on the recommendation. The complete texts of the comments are in Part III.

Director, Operational Test and Evaluation, Comments. The Director partially concurred with the finding, stating that statute requires him to prepare the independent live-fire report for the Secretary of Defense and the four Defense-related committees of Congress. Therefore, he places a heavy emphasis on live-fire report preparation, clarity, completeness, and especially accuracy and timeliness. Further, he discussed the assistance that IDA provided in the preparation of the live-fire report. He felt that, with the move of the LFT&E mission to the DOT&E office, considering LFT&E results in the context of operational test and evaluation results and operational test and evaluation results in the context of LFT&E results made a lot of sense. Therefore, for those programs that require both a beyond low-rate initial production report and live-fire report, he stated that his office often prepares and submits those reports under one cover. He stated that the combination of reports enables a more efficient, balanced, and complete assessment of the system. However, he noted that, to enable the combined reports to be more concise and readable, his office removes a significant amount of technical material that had been previously included in LFT&E reports. He added that, nevertheless, the removed material is critical to the overall conclusions drawn in the combined reports and should be retained for future reference.

Next, the Director discussed the publishing of IDA technical reports. He noted that the draft report was correct in stating that those technical reports were often published long after the live-fire report goes to Congress. He stated that the only requirement is that the technical work be performed to draw the correct conclusions before submission. Further, he stated that the technical reports contain vital information that should be retained for future use and reference. The information will serve as a baseline for comparison with future upgrade systems on oversight. As a result, he plans to maintain those files for future reference.

Finding B. Reporting Live-Fire Test and Evaluation Results

Audit Response. We agree with the Director, Operational Test and Evaluation, comments.

Director, Test, Systems Engineering and Evaluation, Comments. The Director partially agreed with the finding, stating that DOT&E should have the flexibility to direct the preparation of separate technical reports when the reports appear to have some future value. The preparation of separate technical reports is pertinent given the trend to use past test data to reduce the costs of future test costs.

Audit Response. DOT&E should have the flexibility to prepare a separate technical report; however, DOT&E should only prepare the formal technical report when necessary. As the Director, Operational Test and Evaluation, noted, he will still have a significant amount of technical material available for future reference even if IDA does not prepare a formal technical report.

Recommendation, Management Comments, and Audit Response

B. We recommend that the Director, Operational Test and Evaluation, eliminate the practice of obtaining formal live-fire test and evaluation technical reports from the Institute for Defense Analyses and, instead, require the Institute for Defense Analyses to retain its technical analysis documentation necessary to support input to the combined beyond low-rate initial production and live-fire reports and live-fire-oversight-only reports to Congress.

Director, Operational Test and Evaluation, Comments. The Director concurred with the recommendation, stating that he has removed the requirement from the renewal contract with IDA to have an LFT&E technical report as a mandatory deliverable for every program.

Director, Air Force Test and Evaluation Directorate, Comments. Although not required to comment, the Director disagreed with the finding and recommendation. The Director stated that, according to Subsection 2366(d) of title 10, United States Code, the Secretary of Defense, not DOT&E, submits the live-fire report to Congress. Further, he stated that independent reporting from DOT&E is only required for initial operational test and evaluation as provided in Section 2399 of title 10, United States Code, but is not required in Section 2366 for live-fire reports. He stated that, by combining the live-fire and the operational test and evaluation reports and submitting both of those report to Congress without an intervening Secretary of Defense review, the Secretary's control over the live-fire report contents before submission is compromised. He further stated that the beyond low-rate initial production report and the live-fire report must remain separate to ensure that the Secretary of Defense can edit the live-fire report before the Secretary submits the report to Congress, as mandated by Section 2366 of title 10, United States Code.

Finding B. Reporting Live-Fire Test and Evaluation Results

Audit Response. DoD Directive 5000.1, "Defense Acquisition," March 15, 1996, which the Secretary of Defense signed, authorizes the publication of DoD Regulation 5000.2-R. The DoD Regulation 5000.2-R, Appendix IV, requires DOT&E to conduct an assessment of Military Department LFT&E programs and prepare the Secretary of Defense's LFT&E assessment report to Congress. Combining the beyond low-rate initial production (operational test and evaluation) and live-fire reports to Congress does not compromise the control of the Secretary of Defense over the live-fire report contents before submission. Subsection 2399(b) of title 10, United States Code, requires DOT&E to submit the beyond low-rate initial production report to the Secretary of Defense, the Under Secretary of Defense for Acquisition and Technology, and the congressional Defense committees before a final decision to proceed with a program beyond low-rate initial production. Further, the subsection states that the Secretary of Defense may provide comments that accompany the report to Congress. Because the life-fire report is combined with the beyond low-rate initial production report to the Secretary, the Secretary can provide comments that accompany the report to Congress.

Finding C. Processing Requests for Waiver From Full-Up, System-Level Survivability or Lethality Tests

For 3 of 13 major systems reviewed, the Military Departments did not process requests for waiver from full-up, system-level survivability or lethality tests in a timely manner. The Military Departments did not process the requests in a timely manner because of the belief that LFT&E legislation did not apply to one of the systems, because of conflicting LFT&E guidance, and because completing the waiver process was a low priority. Unrelated to the three systems reviewed, the DoD criteria describing the waiver process were not consistent. The waiver-process criteria were not consistent because Section 3.4.9 and Appendix IV of DoD Regulation 5000.2-R detail different procedures for processing a request for waiver from full-up, system-level survivability or lethality testing. Delays in submitting and approving a request for waiver increase the risk that program offices will not have sufficient LFT&E results available before the program full-rate production decision, causing decisionmakers to postpone the full-rate production decision, the Military Departments to slip the release of the system to the user, and the program costs to increase.

Waiver From Full-Up, System-Level Survivability or Lethality Tests

Statutory Requirements. Section 2366 of title 10, United States Code, provides that the Secretary of Defense may waive the application of survivability or lethality tests to a covered system, munitions program, or covered product improvement. To do so, the Secretary must certify to Congress, before the system or program enters engineering and manufacturing development, that live-fire testing of such a system or program would be unreasonably expensive and impractical. With the certification, the Secretary must include a report explaining how the Secretary plans to evaluate the survivability or the lethality of the system or program and assessing possible alternatives to realistic (full-up, system-level) survivability or lethality testing of the system or program.

DoD Requirements. The DoD Regulation 5000.2-R, Section 3.4.9, "Live Fire Test and Evaluation," and Appendix IV, "Live Fire Test and Evaluation Reports, Mandatory Procedures & Formats, Waivers," provide guidance for waivers from full-up, system-level survivability or lethality testing.

Section 3.4.9. Section 3.4.9 states that the Secretary of Defense delegated authority to the Defense Acquisition Executive (DAE) for Acquisition Category ID programs and to the Component Acquisition Executive (CAE) for less than Acquisition Category ID programs to waive the requirement for

Finding C. Processing Requests for Waiver From Full-Up, System-Level Survivability or Lethality Tests

full-up, system-level survivability or lethality tests if the DAE or the CAE certifies to Congress before the program enters engineering and manufacturing development that full-up, system-level testing of the program would be unreasonably expensive and impractical.

As an alternative to full-up, system-level survivability or lethality tests, the DAE or the CAE may authorize testing of a system or program by firing munitions likely to be encountered in combat at components, subsystems, and subassemblies, together with performing design analyses, modeling and simulation, and analyses of combat data. Within the request for waiver from full-up, system-level survivability and lethality testing, the respective program office⁸ is to include a strategy for such alternative testing. The DOT&E and the Director, Test, Systems Engineering and Evaluation, are to jointly review the strategy, and DOT&E is to approve it. Such alternative testing may not be carried out unless the DAE or the CAE certifies to Congress before the program enters engineering and manufacturing development that full-up, system-level survivability or lethality testing of the program would be unreasonably expensive and impracticable.

The respective program office⁸ is to address waivers and the use of alternative survivability and lethality testing in the test and evaluation master plan for the covered system, program, or covered product improvement program. Further, Section 3.4.9 states that the respective Military Department⁹ is to submit CAE certifications and reports, required under Subsection 2366(c) of title 10, United States Code, to Congress through DOT&E and the DAE.

Appendix IV. Appendix IV states that the Military Department requesting a waiver from full-up, system-level survivability or lethality testing will include a report explaining how the Military Department plans to evaluate the survivability or lethality of the system or program and will assess possible alternatives to full-up, system-level survivability or lethality testing. Further, Appendix IV states that the Military Department Secretary is to submit a request for waiver from full-up, system-level survivability or lethality testing to the Deputy Secretary of Defense after DOT&E has formally coordinated the request for waiver.

Obtaining Waivers for Three Major Systems

For 3 of 13 major systems reviewed, the Military Departments did not process requests for waiver from full-up, system-level survivability or lethality tests in a timely manner. The three major systems were: the Arleigh Burke (DDG-51)

⁸Section 3.4.9 does not specify who prepares the request for waiver; however, Section 3.4.9 implies that it is the program office.

⁹Section 3.4.9 does not specify who submits the request for waiver; however, Section 3.4.9 implies that it is the Military Department.

Finding C. Processing Requests for Waiver From Full-Up, System-Level Survivability or Lethality Tests

Class Destroyer, the F-22 Aircraft, and the MH-47E and MH-60K Special Operations Aircraft (Special Operations Aircraft Program). The Military Departments did not process the requests in a timely manner because of the belief that LFT&E legislation did not apply to the DDG-51 ship class, because of conflicting LFT&E guidance, and because completing the waiver process was a low priority.

DDG-51 Ship Class Request for Waiver. The Navy nominated the entire DDG-51 ship class as an LFT&E candidate on April 20, 1987. On November 9, 1992, the Director, Test and Evaluation (now the Director, Test, Systems Engineering and Evaluation),¹⁰ designated Flight IIA of the DDG-51 ship class as a major product improvement program subject to LFT&E. Flight IIA entered Milestone IV, major modification approval, on February 2, 1994. For the entire DDG-51 ship class, including Flights I, II, and IIA, the DDG-51 Program Office submitted a request for waiver from full-up, system-level survivability testing to the Office of the Assistant Secretary of the Navy (Research, Development and Acquisition) (the Assistant Secretary) on August 28, 1995. The DDG-51 Program Office submitted the request for waiver because full-up, system-level survivability testing of the entire DDG-51 ship class would be unreasonably expensive and impractical.

As of August 1997, the Office of the Assistant Secretary had not yet submitted to Congress the request for waiver from full-up, system-level survivability testing for the entire DDG-51 ship class because it believed that Section 2366 of title 10, United States Code, did not apply to the original DDG-51 ship class. The Office of the Assistant Secretary believed that Section 2366 did not apply because the milestone decision authority approved the DDG-51 ship class proceeding beyond low-rate initial production into full-rate production in October 1986 and because it believed that Section 2366:

- o only applied to decisions made after May 31, 1987, to proceed beyond low-rate initial production and

- o did not permit requests for waiver from full-up, system-level survivability testing after a milestone decision authority approves a program entering engineering and manufacturing development, Milestone II.

Even though the Office of the Assistant Secretary does not believe that it needs to submit a request for waiver from full-up, system-level survivability testing, the Navy must request a waiver or must conduct a full-up, system-level survivability test of the DDG-51 ship class because the system is subject to LFT&E. The Office of the DOT&E has continued to oversee the DDG-51 ship class as an LFT&E system based on the Navy nomination of the ship class as an LFT&E candidate and the Director, Test and Evaluation, designation. The Director, Test and Evaluation, designated Flight IIA of the DDG-51 ship class as a major product improvement program subject to LFT&E. Further, the

¹⁰The Federal Acquisition Streamlining Act of 1994 transferred responsibility for monitoring and reviewing LFT&E from the Director, Test, Systems Engineering and Evaluation, to DOT&E.

Finding C. Processing Requests for Waiver From Full-Up, System-Level Survivability or Lethality Tests

DDG-51 Program Office is implementing an alternative LFT&E strategy based on the assumption that the Office of the Secretary of Defense and Congress will approve a request for waiver from full-up, system-level survivability testing. If the Office of the Secretary of Defense and Congress do not approve the request for waiver and associated alternative LFT&E strategy, the Navy may have spent additional resources to implement the alternative LFT&E strategy and, as a consequence, may incur additional cost and may slip the schedule.

F-22 Aircraft System Request for Waiver. In April 1991, the F-22 System Program Office agreed with the Office of the Secretary of Defense that the F-22 Aircraft system was a covered system subject to LFT&E. In August 1991, the F-22 Aircraft system entered into the engineering and manufacturing development phase of the acquisition process. At that time, the F-22 System Program Office intended to perform survivability testing on materials, components, and subassemblies for the F-22 Aircraft system instead of full-up, system-level survivability testing based on LFT&E guidance that the Office of the Secretary of Defense published in 1988. The guidance states that "Full-up testing may include firings against full-scale systems, subsystems, subassemblies, components, or acceptable surrogates that allow realistic threat/weapon interaction to occur."

In 1992, the Office of the Director, Test and Evaluation, notified the F-22 System Program Office that the 1988 LFT&E guidance conflicted with Section 2366 of title 10, United States Code.¹¹ Based on the notification, the F-22 System Program Office began working with the Office of the Secretary of Defense on an alternative LFT&E strategy that complied with Section 2366 and the Air Force intention to perform less than full-up, system-level survivability testing for the F-22 Aircraft system. Consequently, the National Defense Authorization Act for FY 1995 directed the Secretary of Defense to request the National Research Council to conduct a study regarding the practicality of full-up, system-level survivability testing for the F-22 Aircraft system. The National Research Council concluded in July 1995 that the F-22 System Program Office could conduct live-fire testing at levels below a full-up, system-level ground test, which would justify a request for waiver from full-up, system-level survivability testing on the F-22 Aircraft system (Appendix B).

Based on the National Research Council Study, Congress enacted Public Law 104-201, Section 215, "Live-Fire Survivability Testing of F-22 Aircraft," September 23, 1996. The law states that the Secretary of Defense may, in accordance with Subsection 2366(c) of title 10, United States Code, waive for the F-22 Aircraft system the survivability tests that the section requires, even though the system has entered engineering and manufacturing development. The F-22 System Program Office still needs to submit the request for waiver from full-up, system-level survivability testing because the request includes the LFT&E alternative strategy for evaluating the survivability of the F-22 Aircraft system even though Congress has effectively approved the request for waiver.

¹¹In January 1993, the National Research Council issued a report that concludes, in part, that the 1988 LFT&E guidelines and the 1989 LFT&E planning guide were not consistent with the live-fire test law (Appendix B).

Finding C. Processing Requests for Waiver From Full-Up, System-Level Survivability or Lethality Tests

Congressional authorization to submit the request for waiver from full-up, system-level survivability testing does not remove the requirement for the F-22 System Program Office to perform survivability testing of components, subsystems, and subassemblies.

During our audit, the F-22 System Program Office began processing its request to the DAE, through the CAE, for waiver from full-up, system-level survivability tests of the F-22 Aircraft system. As of August 4, 1997, DOT&E approved the alternative LFT&E plan in the test and evaluation master plan for the F-22 Aircraft system and recommended that the DAE grant the waiver. The F-22 System Program Office anticipates that the waiver will be granted before the end of FY 1997. By having an approved waiver, the F-22 System Program Office will have sufficient LFT&E results available before the program full-rate production decision and the decisionmakers will not have to postpone the full-rate production decision until LFT&E results are available.

Special Operations Aircraft Program Request for Waiver. Initially, the Special Operations Aircraft Program (the Program) was not a major system, subject to LFT&E. However, in September 1991, after the Program had passed the low-rate initial production phase in February 1990, the Army Audit Agency concluded that the Program had breached the Acquisition Category II research and development funding threshold because of an increase in research and development funds, which would make it a major system. Consequently, the Program became a covered system, subject to live-fire test and evaluation, in October 1991. However, obtaining a waiver from full-up, system-level survivability testing was a low priority for the Special Operations Aircraft Program Office. In October 1992, Congress enacted Public Law 102-484, Section 142, which required the Special Operations Aircraft Program Office to complete survivability testing of the Program before its full-materiel release date. The Special Operations Command has scheduled full-materiel release for March 1998.

The Army Program Executive Officer, Aviation, managed the Special Operations Aircraft Program until April 1995, at which time the Special Operations Command took over management of the Program. During our audit, the Special Operations Command began working on a request for waiver from full-up, system-level survivability testing for the Program. From December 1996 through February 1997, DOT&E and the Special Operations Command negotiated a revised live-fire strategy that they would include with the request for waiver from full-up, system-level survivability testing. On June 4, 1997, the Special Operations Command Acquisition Executive signed and submitted to Congress, through DOT&E, the request for waiver, including an alternative test strategy. Therefore, this report makes no recommendation to address the issue.

Process for Submitting Requests for Waiver

DoD Regulation 5000.2-R is not consistent within itself concerning the process for submitting requests for waiver from full-up, system-level survivability or

Finding C. Processing Requests for Waiver From Full-Up, System-Level Survivability or Lethality Tests

lethality testing. Depending on the program acquisition category, DoD Regulation 5000.2-R, Section 3.4.9, states that the DAE or the CAE is responsible for waiving the requirements for full-up, system-level survivability or lethality testing and for making required certifications to Congress. Further, Section 3.4.9 states that DOT&E and the Director, Test, Systems Engineering and Evaluation, will jointly review the alternative testing strategy, and DOT&E will approve it.

In contrast, DoD Regulation 5000.2-R, Appendix IV, states that the Military Department Secretaries will submit requests for waiver from full-up, system-level survivability or lethality testing to the Deputy Secretary of Defense (rather than the DAE or the CAE) after DOT&E has formally coordinated the request for waiver. Therefore, Appendix IV implies that the Deputy Secretary of Defense is responsible for waiving the requirements for full-up, system-level survivability or lethality testing and for making the required certifications to Congress. Consequently, Appendix IV does not specifically require that the DAE or the CAE be involved in the process for submitting requests for waiver from full-up, system-level survivability or lethality testing.

Conclusion

Planning and conducting of LFT&E cannot be accomplished until the Office of the Secretary of Defense determines whether a system will be subject to full-up, system-level survivability or lethality testing or to alternative survivability or lethality testing of components, subsystems, and subassemblies, together with performing design analyses, modeling and simulation, and analysis of combat data. Test organizations need to know information on a system's testing requirements early in the engineering and manufacturing development phase of the acquisition process to ensure that the Military Department plans and performs adequate LFT&E before a system's full-rate production decision. Delays in submitting and approving requests for waiver from full-up, system-level survivability or lethality testing increase the risk that program offices will not have sufficient LFT&E results available before the program full-rate production decision, which could cause decisionmakers to postpone the full-rate production decision and the Military Departments to slip the release of systems to the user. Also, resources will be wasted if the Military Departments have to redo test plans or tests. Further, DOT&E needs to ensure that the policy for processing and submitting requests for waiver from full-up, system-level survivability or lethality testing is consistent in Section 3.4.9 and Appendix IV of DoD Regulation 5000.2-R to preclude potential misunderstandings concerning the correct way to process requests for waiver from full-up, system-level survivability or lethality testing. To ensure consistent waiver process policy, DOT&E should make revision recommendations concerning the waiver process in DoD Regulation 5000.2-R to the Defense Acquisition Policy Working Group, the group responsible for changes to DoD Regulation 5000.2-R.

**Finding C. Processing Requests for Waiver From Full-Up, System-Level
Survivability or Lethality Tests**

Management Comments on the Finding and Audit Response

The Director, Operational Test and Evaluation; Director, Test, Systems Engineering and Evaluation; and the Director, Air Force Test and Evaluation Directorate, commented on the finding. The following discussion is a synopsis of those comments and the audit response. The complete texts of the comments are in Part III.

Director, Operational Test and Evaluation, Comments. The Director concurred with the finding, stating that the finding was certainly appropriate and that his office has been dealing with the issue since DoD reissued the DoD 5000 series nearly 2 years ago. He agreed that the waiver process should be clarified and made consistent.

Director, Test, Systems Engineering and Evaluation, Comments. The Director took issue with the audit position that the Office of the Assistant Secretary of the Navy (Research, Development and Acquisition) was in error in believing that it could not submit a request for waiver from full-up, system-level survivability testing for the DDG-51 ship class after the program passed Milestone II, Approval to Enter Engineering and Manufacturing Development. The Director opined that the Office of the Assistant Secretary may be correctly interpreting Section 2366.

Audit Response. We continue to believe that the Navy is not correctly interpreting Section 2366 of title 10, United States Code. Congress has allowed DoD to submit a request for waiver from full-up, system-level survivability testing after a system has entered engineering and manufacturing development. As discussed in the report, Congress enacted Public Law 104-201, Section 215, "Live-Fire Survivability Testing of F-22 Aircraft," September 23, 1996, stating that the Secretary of Defense may, in accordance with Subsection 2366(c) of title 10, United States Code, waive for the F-22 Aircraft system the survivability tests that the section requires, even though the system has entered engineering and manufacturing development.

Director, Air Force Test and Evaluation Directorate, Comments. The Director stated that the draft report presumes that the DDG-51 ship class is subject to LFT&E despite the Office of the Assistant Secretary of the Navy (Research, Development and Acquisition) determination that the system was not a covered system. The Director stated that the report should be rephrased to make clear that this is the opinion of the Inspector General, DoD. The Director rationalized that senior DoD leaders are currently debating the issue of which systems are covered systems and that the issue could impact other systems. He stated that DoD Regulation 5000.2-R, Appendix IV, concedes the difficulty of resolving the issue when the regulation states, "Legal counsel should be consulted to verify the final determination of program status." He summarized by stating that generalizations about the covered status of systems is misleading.

Audit Response. The joint DOT&E and Director, Test, Systems Engineering and Evaluation, annual test and evaluation oversight list that summarizes operational test and evaluation actions, including live-fire testing, designates the

Finding C. Processing Requests for Waiver From Full-Up, System-Level Survivability or Lethality Tests

DDG-51 ship class (all variants) as an acquisition program subject to LFT&E oversight as well as operational and developmental test and evaluation oversight. DoD Regulation 5000.2-R requires DOT&E and the Director, Test, Systems Engineering and Evaluation, to jointly publish an annual test and evaluation oversight list of programs for operational, live-fire, and developmental test and evaluation oversight. The regulation also requires DOT&E to approve candidate systems for LFT&E and to annually review all potential systems for inclusion or exclusion from the LFT&E oversight list.

Concerning DoD Regulation 5000.2-R, Appendix IV, and the statement that "Legal counsel should be consulted to verify the final determination of program status," the regulation also states, "If any doubt exists, the system should be assumed to be covered and appropriate action taken. This includes waiver action if the testing would be unreasonably expensive and impractical."

Recommendations, Management Comments, and Audit Response

C.1. We recommend that the Assistant Secretary of the Navy (Research, Development and Acquisition) submit to Congress the request for waiver from full-up, system-level survivability testing for the Arleigh Burke (DDG-51) Class Destroyer by September 30, 1997.

Assistant Secretary of the Navy (Research, Development and Acquisition) Comments. The Assistant Secretary did not comment on the recommendation. We request that the Assistant Secretary provide comments in response to the final report.

Director, Air Force Test and Evaluation Directorate, Comments. Although not required to comment, the Director, Air Force Test and Evaluation Directorate, disagreed with the recommendation, stating that unless the DDG-51 destroyer is identified as a covered system, a waiver to the statute is not required.

Audit Response. In accordance with DoD Regulation 5000.2-R, DOT&E has designated the DDG-51 ship class (all variants) as an acquisition program subject to LFT&E oversight in the annual test and evaluation oversight list. Therefore, the Navy must submit a request for waiver from full-up, system-level survivability testing or must conduct a full-up, system-level survivability test of the DDG-51 ship class.

C.2. We recommend that the Assistant Secretary of the Air Force (Acquisition) submit to Congress, through the Under Secretary of Defense for Acquisition and Technology, the request for waiver from full-up, system-level survivability testing for the F-22 Aircraft system by September 30, 1997.

**Finding C. Processing Requests for Waiver From Full-Up, System-Level
Survivability or Lethality Tests**

Principal Deputy, Assistant Secretary of the Air Force (Acquisition) Comments. The Principal Deputy concurred with the recommendation, stating that his office intends to submit the request for waiver from full-up, system-level survivability testing for the F-22 Aircraft system by September 30, 1997.

Director, Air Force Test and Evaluation Directorate, Comments. Although not required to comment, the Director agreed with the recommendation.

C.3. We recommend that the Director, Operational Test and Evaluation, recommend to the Defense Acquisition Policy Working Group revisions to Section 3.4.9 and Appendix IV of DoD Regulation 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs," March 15, 1996, to establish a consistent policy for submitting requests for waiver from full-up, system-level survivability and lethality testing.

Director, Operational Test and Evaluation, Comments. The Director concurred, stating that his office has recently published portions of the "DOT&E Notebook" that include fully explained and consistent procedures for processing requests for waiver from full-up, system-level survivability or lethality testing. Further, he plans to submit to the Defense Acquisition Policy Working Group a revised regulation for consideration and inclusion in DoD Regulation 5000.2-R.

Director, Test, Systems Engineering and Evaluation, Comments. Although not required to comment, the Director agreed with the recommendation.

Director, Air Force Test and Evaluation Directorate, Comments. Although not required to comment, the Director agreed with the recommendation.

Finding D. Strengthening Management Controls

The LFT&E Office did not document LFT&E administrative policies and procedures and did not establish procedures for maintaining files to support conclusions and recommendations made on individual LFT&E programs. The LFT&E Office did not document or establish procedures because:

- o DOT&E had not finalized a "DOT&E Notebook" that contains LFT&E administrative policy and procedures and relied on a contractor to provide file documentation and maintenance to support management decisions, and

- o the LFT&E Office did not specifically address documenting LFT&E administrative policy and procedures for LFT&E program oversight in its 1995 vulnerability risk assessment associated with its management control program.

As a result, LFT&E action officers did not have information needed to perform their job responsibilities most efficiently, did not maintain consistent and complete LFT&E program files, and could not transfer LFT&E oversight responsibilities to new LFT&E action officers in the most orderly manner.

Management Control Program Background

Management Control Program Requirement. The DoD Directive 5010.38, "Internal Management Control Program," April 14, 1987,¹² requires DoD managers to implement a comprehensive system of management controls that provide reasonable assurance that programs and administrative functions are effectively and efficiently carried out in accordance with applicable law and management policy and to evaluate the adequacy of the controls. Management controls are the organization, policies, and procedures that managers establish to ensure quality and timeliness of their programs' performance, to increase productivity, to control costs, to mitigate adverse aspects of agency operations, and to ensure that their staff manages the program with integrity and compliance with applicable laws.

¹²The Office of DOT&E used the April 1987 version of the Directive to perform its vulnerability risk assessment for the LFT&E function. The DoD revised DoD Directive 5010.38 as "Management Control (MC) Program," August 26, 1996.

Finding D. Strengthening Management Controls

Contractor Study. In July 1996, the Deputy Director, Live Fire Test, Office of the DOT&E (the Deputy Director), initiated a study with International Development and Resources, Incorporated (the Contractor), to evaluate the LFT&E processes. The purpose of the study was to propose an approach for raising the productivity of LFT&E personnel in the Office of the DOT&E by process improvement, training, and the application of technology. For the study, the Contractor issued to the Deputy Director a final report, "Internal Automation Support for LFT&E," May 5, 1997, which identified, among other things, the need for a handbook for rotational training assignment action officers.¹³ The handbook would contain LFT&E policies and office procedures to help rotational employees transition to their LFT&E duties. The report also identified the need for a uniform document filing system and a central computer data base for LFT&E program documents that LFT&E action officers could access remotely. The report provided time estimates to develop and implement the uniform document filing system and the central computer data base. During our audit, the Deputy Director requested the Contractor to expedite completion of a draft of the "Rotational Training Assignment Action Officer Handbook" for his review. As of August 1997, DOT&E officials had not yet received the draft handbook.

Live-Fire Test and Evaluation Management Controls

The LFT&E Office did not document LFT&E administrative policies and procedures and did not establish procedures for maintaining files to support conclusions and recommendations made on individual LFT&E programs. The LFT&E Office did not document or establish procedures because DOT&E had not finalized a "DOT&E Notebook" that contains operational and live-fire test and evaluation administrative policy and procedures and relied on a contractor to provide file documentation and maintenance to support conclusions and recommendations that DOT&E officials made on individual LFT&E programs. In addition, the LFT&E Office did not specifically address documenting LFT&E administrative policy and procedures for LFT&E program oversight in its 1995 vulnerability risk assessment associated with its management control program.

Administrative Policies and Procedures. The Office of the DOT&E had started but did not complete an effort to document its administrative policies and procedures, including LFT&E administrative policies and procedures. Around February 1996, DOT&E initiated the development of a "DOT&E Notebook" to provide general guidance for DOT&E action officers and to supplement the policy and procedures for operational and live-fire tests and evaluations contained in the DoD Regulation 5000.2-R. The "DOT&E Notebook" contains information on the DOT&E organization, testing methodologies, test plans, and

¹³Rotational training assignments in the DOT&E Live Fire Test and Evaluation Office are typically for 1 year.

Finding D. Strengthening Management Controls

reports to Congress. However, as of August 1997, the "DOT&E Notebook" is still in draft. DOT&E anticipates that the "DOT&E Notebook" will be published before September 30, 1997.

Maintaining Files. The LFT&E Office did not have a standard operating procedure for maintaining program documentation such as test and evaluation master plans, operational requirement documents, minutes of meetings, and trip reports in the LFT&E files. The Institute for Defense Analyses tracks the status of each LFT&E program for the LFT&E Office. When auditors requested program documents during the audit, the LFT&E action officers generally could not locate documents because they did not have a standard filing system. Instead, they requested the documents from the Institute for Defense Analyses.

Vulnerability Risk Assessment. On June 23, 1995, the Deputy Director prepared a vulnerability risk assessment in accordance with DoD Directive 5010.38. The Deputy Director assessed the LFT&E function as having a low risk of susceptibility to fraud, waste, or mismanagement. The Deputy Director did not specifically address the lack of documented LFT&E Office administrative policy and procedures or the LFT&E file system used to maintain documentation to support conclusions and recommendations that DOT&E officials made on individual LFT&E programs for LFT&E program oversight in the LFT&E Office's vulnerability risk assessment associated with its management control program.

Effect on Management Controls

Without a finalized "DOT&E Notebook" that contains LFT&E administrative policy and procedures and that establishes procedures for maintaining files, LFT&E action officers did not have information needed to perform their job responsibilities most efficiently, did not maintain consistent and complete LFT&E program files, and could not transfer LFT&E oversight responsibilities to new LFT&E action officers in the most orderly manner.

Conclusion

The Office of the DOT&E needs to complete its ongoing action to document LFT&E administrative policies and procedures in the "DOT&E Notebook." The Office of the DOT&E also needs to establish a standard filing system to ensure compliance with management policies and procedures and to enable action officers to perform their job responsibilities most efficiently. The establishment of a standard filing system will improve productivity of action officers by eliminating the need for action officers to search for critical program documents; will ensure a written record of program information, such as correspondence, minutes of meetings, and analyses, for providing program oversight; and will reduce the time that a new action officer needs to become familiar with the specifics of an LFT&E program.

Finding D. Strengthening Management Controls

Written policies and procedures are essential internal controls and valuable tools to train new employees, especially in the LFT&E Office because the staff of action officers regularly includes rotational employees. For example, as of January 1, 1997, the Deputy Director had a staff of seven action officers, including three rotational employees. Two of the three rotational employees were on board fewer than 3 months, and three of the four permanent LFT&E action officers had been on board for less than a year.

To help new action officers transition to LFT&E responsibilities, the Deputy Director has begun developing the "Rotational Training Assignment Action Officer Handbook." In our opinion, DOT&E needs to finalize and issue the "DOT&E Notebook" and needs to include appropriate information from the "Rotational Training Assignment Action Officer Handbook" in the "DOT&E Notebook."

Management Comments on the Finding and Audit Response

Director, Operational Test and Evaluation, Comments. The Director partially concurred with the finding, noting that the DoD 5000 series has more descriptive material on live-fire testing than for nearly any other subject. He stated that his office uses the creative innovations and the DoD 5000 series to help train the LFT&E staff, including the one-year rotational trainees in his office. Therefore, the Director stated that he could only partially concur with the finding that LFT&E administrative policies and procedures were not well known and established. The complete text of the comments are in Part III.

Audit Response. In view of the agreed upon actions in response to the finding, the extent to which the policies and procedures are not well known and established in the absence of documentation, is a moot issue.

Recommendations, Management Comments, and Audit Response

D. We recommend that the Director, Operational Test and Evaluation:

1. Complete and issue by September 30, 1997, the "Director, Operational Test and Evaluation, Notebook" for action officers to include written policies and procedures to describe and document the live-fire test and evaluation management control process, appropriate information from the "Rotational Training Assignment Action Officer Handbook," and a standard system for maintaining live-fire test and evaluation program files.

Director, Operational Test and Evaluation, Comments. The Director concurred, stating that his office has accelerated the completion of the "DOT&E

Finding D. Strengthening Management Controls

Notebook." He further stated that the full integration of the LFT&E policies and procedures has been completed in draft and should be published before September 30, 1997.

Director, Air Force Test and Evaluation Directorate, Comments. Although not required to comment, the Director agreed with the recommendation.

2. Review Live-Fire Test and Evaluation Office administrative policy and procedures and the related system used to document and support conclusions and recommendations made for live-fire test and evaluation program oversight as part of its management control program self-evaluation. Appendix A provides details on the adequacy of the management control program self-evaluation.

Director, Operational Test and Evaluation, Comments. The Director concurred, stating that his office will review LFT&E administrative procedures relating to the documentation and support of conclusions and recommendations made for LFT&E program oversight.

Director, Air Force Test and Evaluation Directorate, Comments. Although not required to comment, the Director agreed with the recommendation.

Part II - Additional Information

Appendix A. Audit Process

Scope and Methodology

We conducted this audit from August 1996 through June 1997 and reviewed documentation dated from September 1986 through May 1997. To accomplish the audit objective, we:

- o discussed LFT&E policy and procedures with personnel in the Office of the Under Secretary of Defense for Acquisition and Technology, the Office of the DOT&E, and selected Military Department program offices, test organizations, and contractor facilities;

- o assessed whether DOT&E and the Military Departments were performing LFT&E analyses in accordance with Section 2366 of title 10, United States Code, and DoD Regulation 5000.2-R;

- o reviewed the DOT&E live-fire test and evaluation reporting process for reports provided to DoD milestone decision authorities and Congress;

- o reviewed requests for waiver from full-up, system-level survivability and lethality testing to determine whether the milestone decision authority made the determination before the engineering and manufacturing development decision that survivability or lethality testing of a system was unreasonably expensive and impractical and identified acceptable alternative survivability or lethality tests;

- o assessed whether the Military Departments conducted verification, validation, and accreditation of modeling and simulation applications that the Military Departments used for survivability and lethality analyses;

- o reviewed test and evaluation master plans, including associated LFT&E appendixes or attachments, LFT&E strategies and plans, Military Department LFT&E reports, LFT&E program budgets, and detailed program schedules for selected programs;

- o identified the roles of the Office of the DOT&E and appropriate LFT&E management groups within each Military Department relative to the DoD live-fire test and evaluation process;

- o determined and reviewed the Institute for Defense Analyses' involvement in the LFT&E process;

- o assessed the percentage of a program's total research, development, test, and evaluation and procurement costs that a program office spends on LFT&E; and

- o reviewed the funding for the Live-Fire Test and Evaluation Program and the Operational Field Assessment Program in the Office of the DOT&E.

In accomplishing the objective, we selected from the universe of LFT&E oversight systems 13 major systems to review during the audit: five from the Army, three from the Navy, and five from the Air Force. We subjectively selected the programs to provide a variety of weapon types and a cross-section of DoD acquisition organizations while considering the amount of prior audit coverage. The programs were in various phases of the acquisition process, ranging from program definition and risk reduction to production, fielding/deployment, and operational support. The 13 major systems selected were:

- o the Army Command and Control Vehicle, the M2A3 Bradley Fighting Vehicle, the MH-47E and MH-60K Special Operations Aircraft (Chinook and Black Hawk helicopters), the Sense and Destroy Armor submunition, and the Wide Area Munition smart munition;

- o the Navy Air-to-Air Intercept Missile-9X Sidewinder missile, the Arleigh Burke (DDG-51) Class Destroyer, and the Joint Standoff Weapon (Baseline Version); and

- o the Air Force B-2 Spirit aircraft, the C-130J Hercules aircraft, the F-16 Close-Air Support Aircraft/Battlefield Air Interdiction aircraft, the F-22 Aircraft, and the Joint Air-to-Surface Standoff Missile.

Appendix H describes the 13 programs.

To determine how the Office of the DOT&E managed the preparation of the LFT&E report that DOT&E prepares for the Office of the Secretary of Defense and Congress, we selected for review the four reports that DOT&E prepared since the Federal Acquisition Streamlining Act of 1994 required DOT&E to monitor and review live-fire testing. Those reports were for the M903 Caliber 0.50 Saboted Light Armor Penetrator Ammunition, September 1995; the AH-64D Longbow Apache Attack helicopter, October 1995; the C-17 Globemaster III airlift aircraft, November 1995; and the M430A1 40mm Cartridge, May 1996. For the AH-64D helicopter and the C-17 aircraft, DOT&E combined the beyond low-rate initial production report with the LFT&E report because those programs were subject to DOT&E operational and live-fire test and evaluation oversight. We examined those LFT&E reports, compared those reports to the Military Department live-fire test reports, and reviewed the LFT&E report preparation process at the Office of the Secretary of Defense and the Institute for Defense Analyses.

Auditing Standards. We conducted this program audit in accordance with auditing standards issued by the Comptroller General of the United States, as implemented by the Inspector General, DoD. We included such tests of management controls as we deemed necessary. We did not rely on computer-processed data to develop conclusions on this audit. Congressional affairs specialists from the Office of Congressional Liaison, Inspector General, DoD,

and technical experts from the Quantitative Methods Division of the Analysis, Planning, and Technical Support Directorate, Inspector General, DoD, assisted in the audit.

Contacts During the Audit. We visited or contacted individuals and organizations within DoD; the Senate Subcommittee on Defense, Committee on Appropriations; the Senate Committee on Armed Services; the House Subcommittee on National Security, Committee on Appropriations; the House Subcommittee on Military Research and Development, Committee on National Security; Advanced System Development, Incorporated; the Institute for Defense Analyses; International Development and Resources, Incorporated; and Lockheed Martin. Further details are available upon request.

Management Control Program

The DoD Directive 5010.38, "Management Control (MC) Program," August 26, 1996, requires DoD managers to implement a comprehensive system of management controls that provides reasonable assurance that programs are operating as intended and to evaluate the adequacy of the controls.

Scope of Review of Management Control Program. We limited our review because of relevant coverage in Inspector General, DoD, Report No. 96-028, "Implementation of the DoD Management Control Program for Major Defense Acquisition Programs," November 28, 1995. The report discusses the effectiveness of the management control program that the Defense Acquisition Executive and the Component Acquisition Executives used for major Defense acquisition programs. The report concludes that the acquisition community had not effectively integrated DoD Management Control Program requirements into its management assessment and reporting processes. As a result of the report recommendations, the Under Secretary of Defense for Acquisition and Technology integrated DoD Directive 5010.38 requirements into the March 15, 1996, revisions to DoD Directive 5000.1, "Defense Acquisition," and DoD Regulation 5000.2-R. Acquisition managers are now to use program cost, schedule, and performance parameters as control objectives to implement the DoD Directive 5010.38 requirements. The managers are to identify material weaknesses through deviations from approved acquisition program baselines and exit criteria in the "Defense Acquisition Executive Summary" report. Accordingly, we limited our review to management controls of the LFT&E process at the DOT&E Live Fire Test and Evaluation Office and the 13 major systems reviewed in Appendix H.

Adequacy of Management Controls. We identified material management control weaknesses for the LFT&E process at the DOT&E Live Fire Test and Evaluation Office as defined by DoD Directive 5010.38. The DOT&E Live Fire Test and Evaluation Office management controls for the LFT&E administrative process did not ensure that all programs subject to LFT&E requirements were correctly identified as LFT&E candidates and placed on the annual LFT&E oversight list and did not ensure that LFT&E Office

administrative policy and procedures were established. Recommendation A., if implemented, will help ensure that DOT&E correctly and in a timely manner identifies all programs as LFT&E candidates. Recommendation D., if implemented, will ensure that DOT&E completes and issues the "Director, Operational Test and Evaluation, Notebook" for action officers to include written policies and procedures to describe and document the LFT&E management control process. We will provide a copy of this report to the senior official responsible for management controls in the Office of the DOT&E.

Adequacy of Management's Self-Evaluation. DOT&E Live Fire Test and Evaluation Office officials identified LFT&E as an assessable unit and, in our opinion, correctly identified the risk associated with LFT&E as low. However, in their evaluation, the DOT&E officials did not identify the specific material management control weaknesses that the audit identified because the DOT&E evaluation did not specifically address the lack of documented LFT&E Office administrative policies and procedures or the LFT&E file system used to maintain documentation to support conclusions and recommendations for individual LFT&E programs subject to LFT&E program oversight. However, the DOT&E evaluation did evaluate management attitude; organizational structure; personnel; delegation and communication of authority and responsibility; DoD policies and procedures but not specifically LFT&E Office policies and procedures; planning, budgeting, and accounting; organizational checks and balances; automated data processing considerations; contracts; financial reporting; impact outside the agency; degree of centralization; general and specific standards; and audit resolution.

Matter of Concern

During the audit, we determined whether the Military Departments conducted verification, validation, and accreditation (VV&A) of modeling and simulation applications that they used for survivability and lethality analyses. However, the area did not result in a finding or recommendation because Inspector General, DoD, Report No. 93-060, "Duplication/Proliferation of Weapon Systems' Modeling and Simulation Efforts Within DoD," March 1, 1993, addressed VV&A of modeling and simulation applications. The report states, in part, that the Military Departments had not verified, validated, or accredited the majority of models and simulations used in DoD. The lack of VV&A occurred because the DoD had no requirement, criterion, or standard by which to accomplish a VV&A process. In response, DoD issued DoD Directive 5000.59, "DoD Modeling and Simulation (M&S) Management," January 4, 1994, that requires DoD components to establish VV&A policies, procedures, and guidelines for modeling and simulation applications. The directive states that the DoD Component is to accredit the modeling and simulation applications used to support major DoD decisionmaking organizations and processes for its own forces and capabilities. Further, the directive requires the DoD

Appendix A. Audit Process

Component to assign a DoD modeling and simulation executive agent to establish VV&A procedures for applying common or general use models and simulations.

During our live-fire test and evaluation audit, we noted that the Military Departments were using modeling and simulation to supplement live-fire tests and evaluations but had not conducted VV&A of the computer models and simulations used for live-fire survivability and lethality analyses of weapons systems. However, for 19 of the 26 models associated with the programs reviewed during the audit, the respective Military Departments were planning to verify, validate, and accredit the models before using them for live-fire survivability or lethality analyses. For two of the seven remaining models, the Office of the Director, Test, Systems Engineering and Evaluation, and the respective Military Department responsible for VV&A of the models lacked funding to verify, validate, and accredit the models. For three of the seven models, the respective Military Departments stated that the models had undergone some form of informal VV&A; however, the Military Departments were not planning to conduct additional VV&A. For the remaining two models, the responsible Military Department did not have plans to use one of the models after its current application and did not believe that accreditation was necessary for the other model because the Military Department used the model extensively. Nonetheless, the responsible Military Department should have conducted VV&A of the models. Without the Military Departments conducting the VV&A, the models may not accurately represent the developer's conceptual description and specifications and may not be an accurate representation of real-world results.

Appendix B. Summary of Prior Coverage

During the last 5 years, the General Accounting Office and the Military Department audit agencies have not issued reports specifically addressing the effectiveness of the DoD implementation of live-fire testing requirements for major Defense systems in Section 2366 of title 10, United States Code. However, the Inspector General, DoD, in 1997 and the National Research Council in 1993 and 1995 issued reports on live-fire testing issues.

Inspector General, DoD

Inspector General, DoD, Report No. 97-064, "Air-to-Air Intercept Missile-9X Program," January 10, 1997, discusses the adequacy of the program management of the Air-to-Air Intercept Missile-9X Program. The audit concluded that, although the program was still early in development, the Program Office was effectively managing the acquisition. Concerning live-fire testing, the report states that the Program Manager required the contractor to validate models and simulations at least quarterly with data obtained from flight and subsystem tests. Accordingly, the Program Office planned to use actual missile system and subsystem test and evaluation results to determine the efficacy of modeling and simulation demonstrations, and the results from modeling and simulation demonstrations will supplement actual test and evaluation results used to determine operational effectiveness and suitability.

National Research Council

National Research Council Report, "Live Fire Testing of the F-22," July 1995, discusses:

- o the practicality of full-up, system-level survivability testing for the F-22 Aircraft system;

- o the implications regarding the affordability of the F-22 System Program Office conducting or not conducting the survivability tests, including an assessment of the potential life-cycle benefits that could be derived from full-up, system-level survivability testing in comparison to the cost of such testing;

- o the changes that have occurred to the F-22 Aircraft system since completion of the engineering and manufacturing development decision program

Appendix B. Summary of Prior Coverage

review to cause the program manager to request a waiver from full-up, system-level survivability tests for the F-22 Aircraft system that was not requested at the time of the program review; and

- o the sufficiency of the F-22 Aircraft system testing plans to fulfill the requirements and purposes of Section 2366 of title 10, United States Code.

The report concludes that the F-22 System Program Office could conduct live-fire testing at levels below full-up, system-level survivability testing, so a request for waiver from full-up, system-level survivability testing for the F-22 Aircraft system was justified. The report recommended additional live-fire tests for components and continued DoD efforts to develop viable cost-benefit methodologies for planning the extent of live-fire testing.

National Research Council Report, "Vulnerability Assessment of Aircraft, A Review of the Department of Defense Live Fire Test and Evaluation Program," January 1993, reviewed current methodologies that the Army, the Navy, and the Air Force used to determine the vulnerability of airborne systems to enemy conventional weapons; evaluated the cost and effectiveness of those methodologies; evaluated the most appropriate methodologies for the application; and reviewed the current direction on live-fire testing and evaluation. The report concludes that:

- o the live-fire test law (Section 2366 of title 10, United States Code) was satisfactory in its present form because of the waiver process;

- o the 1987 live-fire test law mandates live-fire testing of full-scale, full-up aircraft, including on-board ordnance, unless the Office of the Secretary of Defense approved a request for waiver;

- o the 1988 LFT&E guidelines and the 1989 LFT&E planning guide were not consistent with the live-fire test law; and

- o the implied intent of the live-fire test law was to force the consideration of vulnerability during the design process.

Appendix C. Section 2366 of Title 10, United States Code

UNITED STATES CODE ANNOTATED
TITLE 10. ARMED FORCES
SUBTITLE A--GENERAL MILITARY LAW
PART IV--SERVICE SUPPLY, AND PROCUREMENT
CHAPTER 139--RESEARCH AND DEVELOPMENT

Current through P.L. 105-15, approved 5-15-97

§ 2366. Major systems and munitions programs: survivability testing and lethality testing required before full-scale production

(a) Requirements.--(1) The Secretary of Defense shall provide that--

(A) a covered system may not proceed beyond low-rate initial production until realistic survivability testing of the system is completed in accordance with this section and the report required by subsection (d) with respect to that testing is submitted in accordance with that subsection; and

(B) a major munition program or a missile program may not proceed beyond low-rate initial production until realistic lethality testing of the program is completed in accordance with this section and the report required by subsection (d) with respect to that testing is submitted in accordance with that subsection.

(2) The Secretary of Defense shall provide that a covered product improvement program may not proceed beyond low-rate initial production until--

(A) in the case of a product improvement to a covered system, realistic survivability testing is completed in accordance with this section; and

(B) in the case of a product improvement to a major munitions program or a missile program, realistic lethality testing is completed in accordance with this section.

(b) Test guidelines.--(1) Survivability and lethality tests required under subsection (a) shall be carried out sufficiently early in the development phase of the system or program (including a covered product improvement program) to allow any design deficiency demonstrated by the testing to be corrected in the design of the system, munition, or missile (or in the product modification or upgrade to the system, munition, or missile) before proceeding beyond low-rate initial production.

(2) The costs of all tests required under that subsection shall be paid from funds available for the system being tested.

(c) Waiver authority.--(1) The Secretary of Defense may waive the application of the survivability and lethality tests of this section to a covered system, munitions program, missile program, or covered product improvement program if the Secretary, before the system or program enters engineering and manufacturing development, certifies to Congress that live-fire testing of such system or program would be unreasonably expensive and impractical.

(2) In the case of a covered system (or covered product improvement program for a covered system), the Secretary may waive the application of the survivability and lethality tests of this section to such system or program and instead allow testing of the system or program in combat by firing munitions likely to be encountered in combat at components, subsystems, and subassemblies, together with performing design analyses, modeling and simulation, and analysis of combat data. Such alternative testing may not be carried out in the case of any covered system (or covered product improvement program for a covered system) unless the Secretary certifies to Congress, before the system or program enters engineering and manufacturing development, that the survivability and lethality testing of such system or program otherwise required by this section would be unreasonably expensive and impracticable.

Appendix C. Section 2366 of Title 10, United States Code

(3) The Secretary shall include with any certification under paragraph (1) or (2) a report explaining how the Secretary plans to evaluate the survivability or the lethality of the system or program and assessing possible alternatives to realistic survivability testing of the system or program.

(4) In time of war or mobilization, the President may suspend the operation of any provision of this section.

(d) **Reporting to Congress**—At the conclusion of survivability or lethality testing under subsection (a), the Secretary of Defense shall submit a report on the testing to the the congressional defense committees. Each such report shall describe the results of the survivability or lethality testing and shall give the Secretary's overall assessment of the testing.

(c) **Definitions.**—In this section:

(1) The term "covered system" means a vehicle, weapon platform, or conventional weapon system--

(A) that includes features designed to provide some degree of protection to users in combat; and

(B) that is a major system within the meaning of that term in section 2302(5) of this title. [*]

(2) The term "major munitions program" means--

(A) a munition program for which more than 1,000,000 rounds are planned to be acquired; or

(B) a conventional munitions program that is a major system within the meaning of that term in section 2302(5) of this title.

(3) The term "realistic survivability testing" means, in the case of a covered system (or a covered product improvement program for a covered system), testing for vulnerability of the system in combat by firing munitions likely to be encountered in combat (or munitions with a capability similar to such munitions) at the system configured for combat, with the primary emphasis on testing vulnerability with respect to potential user casualties and taking into equal consideration the susceptibility to attack and combat performance of the system.

(4) The term "realistic lethality testing" means, in the case of a major munitions program or a missile program (or a covered product improvement program for such a program), testing for lethality by firing the munition or missile concerned at appropriate targets configured for combat.

(5) The term "configured for combat", with respect to a weapon system, platform, or vehicle, means loaded or equipped with all dangerous materials (including all flammables and explosives) that would normally be on board in combat.

(6) The term "covered product improvement program" means a program under which--

(A) a modification or upgrade will be made to a covered system which (as determined by the Secretary of Defense) is likely to affect significantly the survivability of such system; or

(B) a modification or upgrade will be made to a major munitions program or a missile program which (as determined by the Secretary of Defense) is likely to affect significantly the lethality of the munition or missile produced under the program.

(7) The term "congressional defense committees" means--

(A) the Committee on Armed Services and the Committee on Appropriations of the Senate; and

(B) the Committee on National Security and the Committee on Appropriations of the House of Representatives.

*Subsection 2302(5) of title 10, United States Code, "Definitions," provides that "The term 'major system' means a combination of elements that will function together to produce the capabilities required to fulfill a mission need. The elements may include hardware, equipment, software or any combination thereof, but excludes construction or other improvements to real property. A system shall be considered a major system if (A) the conditions of section 2302d of this title are satisfied, or (B) the system is designated a 'major system' by the head of the agency responsible for the system."

Appendix D. Definitions of Technical Terms

Accreditation. Accreditation is the official certification that a model or simulation is acceptable to use for a specific purpose.

Acquisition Category. An acquisition category is an attribute of an acquisition program that determines the program's level of review, decision authority, and applicable procedures. The acquisition categories consist of I, major Defense acquisition programs; IA, major automated information systems; II, major systems; and III, all other acquisition programs.

Commercial Item. A commercial item is any item, other than real property, that is of a type customarily used for nongovernmental purposes and that has been sold, leased, or licensed to the general public or has been offered for sale, lease, or license to the general public. A commercial item is also any item that evolved through advances in technology or performance and that is not yet available in the commercial marketplace, but will be available in the commercial marketplace in time to satisfy the delivery requirements under a Government solicitation.

Configured for Combat. Configured for combat refers to a weapon system, platform, or vehicle loaded or equipped with all dangerous materials, including all flammables and explosives, that would normally be on board in combat.

Covered Product Improvement Program. A covered product improvement program is a modification or upgrade to a covered system or to a major munitions program or a missile program that the Secretary of Defense has determined will likely affect significantly the survivability or lethality, respectively, of the system or of the munition or missile produced under the program.

Covered System. A covered system is any vehicle, weapon platform, or conventional weapon system that includes features designed to provide some degree of protection to users in combat and that is a major system.

Detailed Live-Fire Test and Evaluation Plan. A detailed live-fire test and evaluation plan is a document or series of documents that implement the live-fire test and evaluation strategy and that describe the detailed test procedures, test conditions, data collection, and analysis process used during the live-fire test.

Detailed Live-Fire Test and Evaluation Report. A detailed live-fire test and evaluation report provides the results and overall evaluation of all testing identified in the live-fire test and evaluation strategy.

Developing Organization. A developing organization is the command responsible for research, development, and production of a new item.

Appendix D. Definitions of Technical Terms

Full-Materiel Release Process. The full-material release process assures that Army materiel is suitable and supportable before release to users. The program executive officer and the project manager authorize full-materiel release when the materiel meets all established requirements and specifications including the final materiel fielding plan, the materiel fielding agreement, the net equipment training provisions, the logistics support system, the authenticated equipment publications, the basic sustainment materiel needed for initial support, and the elimination or acceptance of identified system hazards.

Full-Up Live-Fire Test. A full-up live-fire test is a vulnerability test of a complete or partial system loaded or equipped with all dangerous materials, including flammables and explosives, that would normally be on board in combat. All critical subsystems that could contribute to the test outcome must be operating under realistic conditions. For lethality testing, the munitions or missile must be production-representative. The target must be representative of the class of systems that includes the threat and must be sufficiently realistic to demonstrate the lethal effects that the weapon is designed to produce.

Full-Up, System-Level, Live-Fire Test. A full-up, system-level, live-fire test is live-fire testing that fully satisfies the statutory requirement for realistic survivability or realistic lethality testing.

Integrated Product Team. An integrated product team is a group of selected individuals representing multiple disciplines formed to produce a specific product or service. The individuals selected have mutual as well as individual accountability; contribute to integrated, concurrent decisionmaking; and are empowered within defined limits to decide and act to ensure the realization of the specific product or service.

Lethality. Lethality is the ability of a munition, laser, or high power microwave to cause damage that will result in the loss or degradation in the ability of a target system to complete its mission.

Live-Fire Test. A live-fire test is a test conducted in accordance with an Office of the Secretary of Defense-approved live-fire test and evaluation strategy that involves the firing of actual munitions at target components, target subsystems, target subassemblies or system-level targets, which may or may not be configured for combat, to examine personnel casualty, vulnerability, or lethality issues, or all three.

Live-Fire Test and Evaluation. Live-fire test and evaluation is full-up, system-level survivability or lethality testing of a covered system, major munition program, missile program, or product improvement to a covered system, major munition program, or missile program before it can proceed beyond low-rate initial production.

Live-Fire Test and Evaluation Strategy. A live-fire test and evaluation strategy is a part of the test and evaluation master plan describing who, what, why, when, where, and how the program manager plans to satisfy the live-fire test and evaluation requirement.

Appendix D. Definitions of Technical Terms

Low-Rate Initial Production. Low-rate initial production is the production of a system in limited quantity to provide articles for operational test and evaluation and to establish an initial production rate sufficient to lead to full-rate production upon successful completion of operational testing.

Major Munitions Program. A major munitions program is a munitions program for which DoD plans to acquire more than one million rounds or a conventional munitions program that is a major system.

Major System. A major system is a system that the Under Secretary of Defense for Acquisition and Technology has estimated will require an eventual total expenditure for research, development, test, and evaluation of more than \$75 million in FY 1980 constant dollars (approximately \$140 million in FY 1996 constant dollars) or for procurement of more than \$300 million in FY 1980 constant dollars (approximately \$645 million in FY 1996 constant dollars). A major system is synonymous with an Acquisition Category II program.

Model. A model is a physical, mathematical, or otherwise logical representation of a system, entity, phenomenon, or process.

Nondevelopmental Item. A nondevelopmental item is an item that meets one of the following criteria:

- o any previously developed item of supply used exclusively for governmental purposes by a Federal agency, a State or local government, or a foreign government with which the United States has a mutual defense cooperation agreement;

- o any item satisfying the previous criteria but that requires only minor modification or modifications of the type customarily available in the commercial marketplace to meet the requirements of the procuring department or agency; or

- o any item produced for Governmental purposes described above but not yet in use.

Realistic Lethality Testing. Realistic lethality testing is testing to determine the lethality of a major munitions program, missile program, or a covered product improvement program by firing the munition or missile concerned at appropriate targets configured for combat.

Realistic Survivability Testing. Realistic survivability testing is testing for vulnerability of a covered system, or product improvement to a covered system, in combat by firing munitions likely to be encountered in combat (or munitions with similar capability) at the system configured for combat, with the primary emphasis on testing vulnerability with respect to potential user casualties and taking into equal consideration the susceptibility to attack and combat performance of the system.

Appendix D. Definitions of Technical Terms

Request for Waiver. A request for waiver is a request to exempt a system from full-up, system-level live-fire testing. The waiver request includes a strategy that explains how the Military Department plans to evaluate the vulnerability or lethality of the system and assesses possible alternatives to full-up, system-level live-fire testing.

Simulation. Simulation is a method for implementing a model over time. Simulation is also a technique for testing, analysis, or training in which testers use real-world systems or in which a model reproduces real-world and conceptual systems.

Survivability. Survivability is the capability of a system and crew to avoid or withstand a man-made hostile environment without suffering an abortive impairment to their ability to accomplish their mission.

Test and Evaluation Master Plan. A test and evaluation master plan is a document that identifies and integrates objectives, responsibilities, resources, and schedules for developmental, operational, and live-fire test and evaluation actions that a program is to accomplish before milestone decision points.

Validation. Validation is a process to determine the degree to which a model is an accurate representation of the real-world from the perspective of the intended users of the model.

Verification. Verification is a process to determine whether a model implementation accurately represents the developer's conceptual description and specifications.

Vulnerability. Vulnerability is the characteristic of a system to sustain a loss or reduction of capability to perform its mission as a result of the effects of a man-made hostile environment. Vulnerability is a subset of survivability.

Appendix E. Audit Response to Air Force Specific Comments Concerning the Report

Our detailed response to the specific comments from the Principal Deputy, Assistant Secretary of the Air Force (Acquisition), and the Director, Air Force Test and Evaluation Directorate, on statements in the draft report follows. The complete texts of those comments are in Part III.

Principal Deputy, Assistant Secretary of the Air Force (Acquisition) Comments. The Principal Deputy stated that the draft report's description of the B-2 Spirit bomber should be corrected for accuracy. He provided a description of the B-2 Spirit bomber.

Audit Response. The report now shows the Principal Deputy's description of the B-2 Spirit bomber.

Director, Air Force Test and Evaluation Directorate, Comments. The Director, Air Force Test and Evaluation Directorate, (the Director) provided specific comments on the term major system, the Internet website, the DoD Regulation 5000.2-R revision, requests for C-17 LFT&E technical report, placement of LFT&E under DOT&E, DOT&E responsibilities, and the issue of including the live-fire law in the report. The follow discuss those specific comments and the audit response.

Term Major System. The Director stated that the report uses the term major Defense system instead of major system to describe the types of systems that Section 2366 of title 10, United States Code, covers. He further stated that Section 2366 addresses only major systems.

Audit Response. Subsection 2366(e)(1)(B) of title 10, United States Code, defines major system within the meaning of that term in Subsection 2302(5) of title 10, United States Code, "Major system: definitional threshold amounts." Subsection 2302(5) differentiates between DoD and civilian agency major systems. Because we have such a wide variety of readers of our reports, we used the term major Defense system in our audit objective and other appropriate places in the report to let the reader know that we were only addressing DoD and not civilian agency major systems in our report.

Internet Website. The Director suggested that we recommend that DOT&E put their LFT&E oversight list on the DOT&E Internet website for review and comment before officially publishing the list.

Audit Response. We provided the Office of the DOT&E with a copy of the Director's comments for consideration.

DoD Regulation 5000.2-R Revision. The Director suggested the deletion of the statement in the report that the Office of the Secretary of Defense was in the process of revising DoD Regulation 5000.2-R to require commercial items, including commercial off-the-shelf items, nondevelopmental items, and

Appendix E. Audit Response to Air Force Specific Comments Concerning the Report

advanced concept technology demonstrators or prototypes that meet the definition of a covered system or major munitions program to be subject to LFT&E. The Director stated that the change has been withdrawn.

Audit Response. As of August 1997, the Defense Acquisition Policy Steering Group that oversees the Defense Acquisition Policy Working Group, the group responsible for changes to DoD Regulation 5000.2-R, was still considering the revision for possible inclusion in future changes to DoD Regulation 5000.2-R. We revised the statement in the report accordingly.

Requests for C-17 Life-Fire Test and Evaluation Technical Report. The Director stated that, despite several requests, the Air Force has not received the IDA technical report on the C-17 LFT&E. He stated that the technical report may contain valuable lessons-learned that could help improve other Air Force programs.

Audit Response. We notified the Office of the DOT&E concerning the Director's request. The Office will take appropriate action.

Placement of Live-Fire Test and Evaluation Under the Director, Operational Test and Evaluation. The Director stated that the report mistakenly states that the Federal Acquisition Streamlining Act (the Act) placed LFT&E under DOT&E. Further, the Director stated that the Act only added a provision to Section 139 of title 10, United States Code, requiring DOT&E to "monitor and review live fire testing activities of the Department of Defense provided for under section 2366 of this title." The Director also stated that DoD moved the LFT&E office and personnel from the Office of the Director, Test, Systems Engineering and Evaluation, to the Office of the DOT&E.

Audit Response. We did not mean to imply that the Federal Acquisition Streamlining Act moved the LFT&E office and personnel from the Office of the Director, Test, Systems Engineering and Evaluation, to the Office of the DOT&E. We modified the report accordingly.

Director, Operational Test and Evaluation, Responsibilities. The Director stated that the draft report incorrectly states that DOT&E accomplishes its oversight responsibilities by reviewing and approving live-fire documents. He stated that Subsection 139(b)(6) of title 10, United States Code, only gives DOT&E authority to "monitor and review live fire testing activities" of DoD. He stated that the DOT&E authority extends only to approving the LFT&E strategy and not the LFT&E plans. Finally, he stated that the last sentence of the referenced paragraph should be revised to indicate that DOT&E oversees LFT&E of a program.

Audit Response. Concerning the DOT&E authority to approve the LFT&E plans, DoD Regulation 5000.2-R requires DOT&E to approve Military Department detailed LFT&E plans identified for DOT&E approval per the matrix of LFT&E phases included in the test and evaluation master plan. Concerning the sentence about DOT&E LFT&E oversight of a program, we revised the sentence accordingly.

Appendix E. Audit Response to Air Force Specific Comments Concerning the Report

Live-Fire Law. The Director suggested that the report include in an appendix the actual live-fire law, Section 2366 of title 10, United States Code, because of the complexity of the issues.

Audit Response. We included the text of Section 2366 in Appendix C of this report.

Appendix F. Live-Fire Test and Evaluation Reporting and Oversight Process

Live-Fire Test and Evaluation Process. After DOT&E designates a program as an LFT&E program, the respective Military Department program manager begins to plan, fund, and execute an LFT&E strategy for the designated program. If full-up, system-level survivability or lethality testing is unreasonably expensive and impractical, the program manager is to prepare a request for waiver from full-up, system-level survivability or lethality testing. The request for waiver is to include alternative plans for evaluating the survivability or lethality of the system. In the test and evaluation master plan, the program manager is to include a description of the LFT&E program and the LFT&E strategy for full-up, system-level or alternative survivability or lethality testing. The program manager also prepares a matrix document that covers all tests within the LFT&E strategy, the test schedule, the issues that the tests will address, and the planning documents that the Military Department proposes for submission to DOT&E for approval or information and review purposes. The live-fire test reporting process diagram in this appendix illustrates the live-fire test process and the DOT&E oversight and reporting processes. The objectives of those DOT&E processes, in addition to meeting congressional reporting requirements, are to:

- o enable the Secretary of Defense to make informed system acquisition decisions,
- o enable the program developers to gain insight into potential design flaws that they can correct before the program enters full-rate production, and
- o ensure that knowledge of user casualties, system survivability, system lethality, or any combination of them are based on full-up, system-level testing or acceptable alternatives when justified by a request for waiver from full-up, system-level survivability or lethality testing.

As the LFT&E program progresses through the acquisition process, the Military Department prepares detailed test and evaluation plans for each test as well as pre-shot predictions. Those plans describe the detailed test procedures, test conditions, and data collection and analysis processes that the Military Department testers will use when conducting each test. Upon completion of each test, the Military Department testers prepare a detailed test and evaluation report. The Military Departments may prepare additional reports to record the results of modeling and simulations and other analyses. Those Military Department live-fire reports are the primary source of data for both the Military Department and DOT&E live-fire test evaluations and assessments.

Within 120 days after completing live-fire testing, the Military Department prepares an evaluation report that contains the results and overall evaluation of all testing identified in the LFT&E strategy for LFT&E programs, and the Military Department provides the report to DOT&E as required by DoD

Appendix F. Live-Fire Test and Evaluation Reporting and Oversight Process

Regulation 5000.2-R. The Military Department may also provide the report to the Component Acquisition Executive and the Defense Acquisition Board, as appropriate.

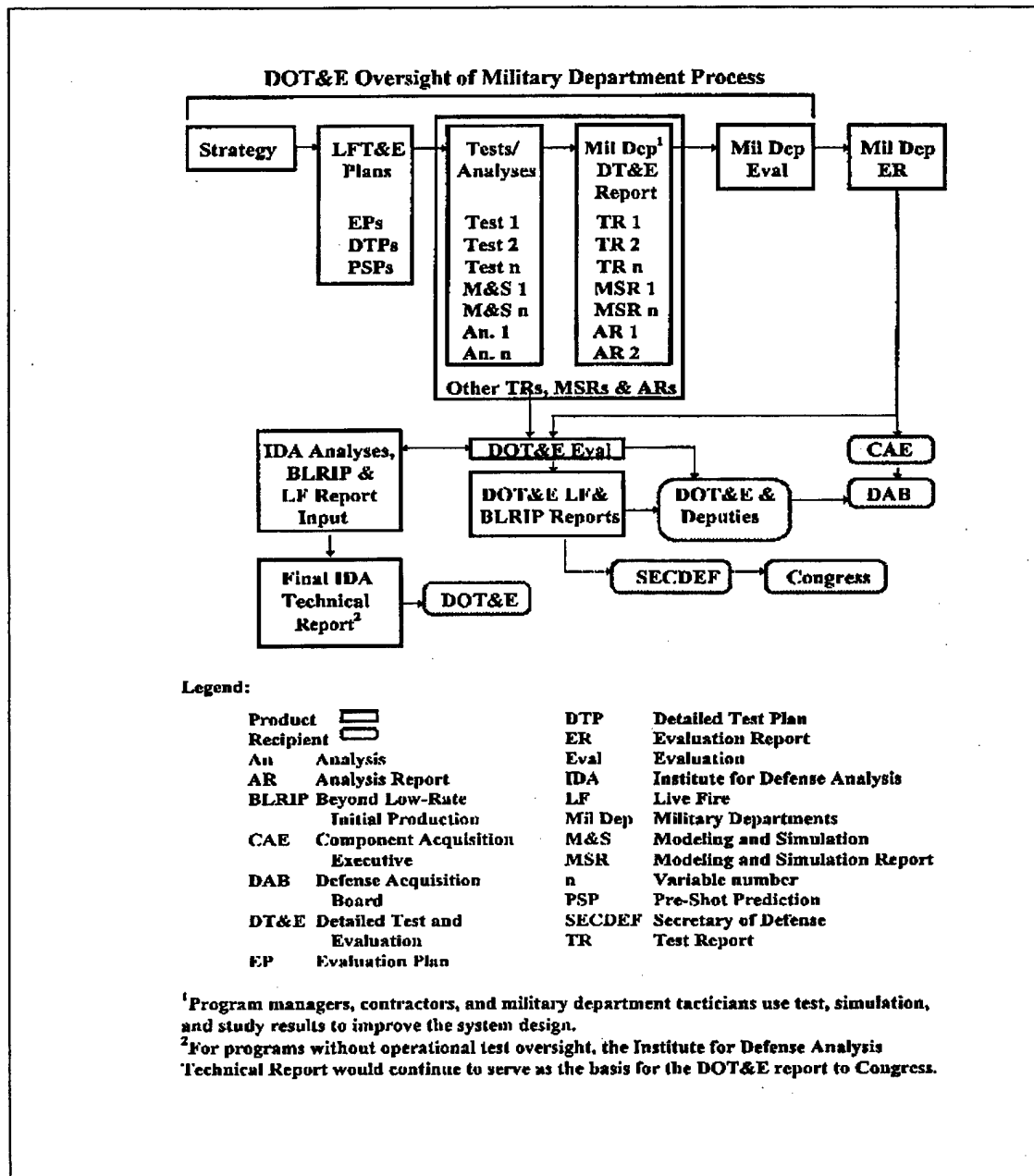
Office of the Director, Operational Test and Evaluation, Oversight Process. The Office of the DOT&E accomplishes its oversight responsibilities by reviewing and approving live-fire documents, by observing live-fire tests, and by preparing an independent assessment report on the system's survivability or lethality and the adequacy of the live-fire tests and evaluations. As part of that oversight, DOT&E reviews and approves Military Department test and evaluation master plans, including LFT&E strategies and plans; attends live-fire testing; and accesses test data, test reports, and other data and reports from models and simulations and other analyses. At the completion of the Military Department LFT&E, DOT&E prepares its independent assessment report using analytical and technical support from IDA. If DOT&E oversees the operational and live-fire testing on the program, DOT&E prepares a combined beyond low-rate initial production and live-fire report on the program.

To prepare the combined report, the DOT&E operational-test action officer, who is responsible for preparing the report, obtains draft input of the live-fire test results and evaluation from IDA. The DOT&E operational-test action officer briefs the results to DOT&E and his deputies, as appropriate. After the draft input to DOT&E, IDA usually prepares a technical report for DOT&E that formally reports its evaluation and the live-fire test results.

For programs subject only to DOT&E live-fire oversight, DOT&E live-fire-test action officers obtain a draft technical report from IDA and modify the report to meet the congressional reporting requirements by adding an introduction and a conclusion that includes an overall assessment of the live-fire results. Later, IDA usually prepares a final technical report for DOT&E.

Using the respective combined beyond low-rate initial production and live-fire report or the modified live-fire technical report, DOT&E provides summary information to the appropriate milestone decision authorities before the program's full-rate production decision. After completing the combined beyond low-rate initial production and live-fire report or modified live-fire technical report, DOT&E provides the respective report to the Secretary of Defense and Congress before the program's full-rate production decision.

Live-Fire Test and Evaluation Reporting Process Diagram



Appendix G. Director, Operational Test and Evaluation, Live-Fire Test Reports to Congress

The DOT&E used the IDA to make an evaluation of the validity of the Military Department live-fire testing, analyses, and program results. After DOT&E became responsible for monitoring and reviewing live-fire actions, DOT&E issued two beyond low-rate initial production reports that combined operational test results with live-fire test results and assessments. Those reports were the "AH-64D Longbow Apache Attack Helicopter," October 1995, and the "C-17 Globemaster III Airlift Aircraft," November 1995. Also, after becoming responsible for live-fire test and evaluation (LFT&E), DOT&E live-fire-test action officers issued two reports for programs subject only to DOT&E live-fire oversight. Those reports were the "Live Fire Test and Evaluation of the 0.50 Caliber M903 Saboted Light Armor Penetrator (SLAP) Ammunition," September 26, 1995, and the "Live Fire Test and Evaluation Report on the M430A1 40MM Cartridge," May 30, 1996.

AH-64D Helicopter Reporting. To properly report on the Hellfire Modular Missile System (Hellfire Missile) and the Modernized Apache helicopter system (Longbow Apache), DOT&E merged those systems into a single DOT&E combined beyond low-rate initial production and live-fire report. The Army Materiel Systems Analysis Activity issued two draft evaluation reports, "Independent Evaluation Report for the Longbow Hellfire Modular Missile System (LBHMMS) Live Fire Test and Evaluation," July 1995, and "Modernized Apache Live Fire Vulnerability Test Independent Evaluation Report," September 1995, and provided those draft reports to DOT&E. IDA provided analyses, charts, graphs, and narrative on the Hellfire Missile and Longbow Apache live-fire tests to the DOT&E operational-test action officer to support the DOT&E preparation of the live-fire test section of the combined beyond low-rate initial production and live-fire report. IDA also provided DOT&E with a draft technical report, IDA Paper P-3092, "Live Fire Test and Evaluation of the AH-64D Longbow Apache," September 22, 1995. The IDA draft technical report provided DOT&E with a basis for writing the Longbow Apache LFT&E portions of its combined beyond low-rate initial production and live-fire report. However, IDA had not conducted a peer review of its draft technical report before it released the report to DOT&E. Further, IDA did not issue either a draft or final technical report on the LFT&E of the Hellfire Missile. IDA did not prepare a Hellfire Missile technical report because the IDA analysts responsible for the technical report did not have time to prepare the report. IDA advised us that it would prepare a Hellfire Missile technical report when and if time becomes available even though DOT&E had already sent the live-fire report to Congress.

DOT&E, in the combined beyond low-rate initial production and live-fire report, "AH-64D Longbow Apache Attack Helicopter," October 1995, concluded that both the initial-operational test and evaluation and the LFT&E results of the Longbow Apache and the Hellfire Missile operational and live-fire tests were adequate to provide the information necessary to determine their operational effectiveness, suitability, and survivability. The DOT&E conducted

Appendix G. Director, Operational Test and Evaluation, Live-Fire Test Reports to Congress

its own peer review of the Longbow Apache combined beyond low-rate initial production and live-fire report before releasing it to Congress. The peer review did not question the lack of IDA technical reports.

C-17 Aircraft Reporting. The Survivability and Vulnerability Information Analysis Center prepared the Air Force LFT&E report, "Technical Summary of C-17 Survivability/Vulnerability Analysis and Test Results, Final Report for Period June 1994 - April 1995," September 1995. DOT&E, in its combined beyond low-rate initial production and live-fire report, "C-17 Globemaster III Airlift Aircraft," November 1995, assessed the C-17 LFT&E program as adequate to support an assessment of its vulnerability. IDA issued its final technical report, IDA Paper P-3093, "Live Fire Test and Evaluation of the C-17 Aircraft," May 3, 1996, about 5 months after the release of the DOT&E combined beyond low-rate initial production and live-fire report and about 7 months after the Survivability and Vulnerability Information Analysis Center released its report.

M903 and M430A1 Munitions Program Reporting. The Office of DOT&E stated that the IDA technical report will continue to be the basis for reporting LFT&E assessments and evaluations for programs that DOT&E has not designated for operational test oversight. The DOT&E live-fire-test action officers are responsible for preparing the LFT&E reports to Congress. The DOT&E has reported on two such programs, the M903 and the M430A1. However, neither of those munitions programs were on the annual test and evaluation oversight list even though they met the requirements of Section 2366. For the M903, the Army notified DOT&E concerning the development of the M903 just before the production decision. Neither the Army nor the Marine Corps identified the M430A1 as a lethality live-fire candidate until well after the Army had completed testing and had begun production. Consequently, DOT&E did not exercise LFT&E oversight over the planning and execution of those two programs.

In March 1995, the Army Materiel Systems Analysis Activity (the Activity) (now the Evaluation Analysis Center) released its evaluation report, "M430A1 Live Fire Evaluation," to DOT&E. The Activity accomplished its evaluation report by reviewing technical test data, combat data, and lethality modeling and analyses that focused on whether the M430A1 effectively increased lethality against light armored vehicles. The Activity did not consider evaluation of the fragmenting characteristics of the round necessary. On May 30, 1996, DOT&E released its LFT&E report, "Live Fire Test and Evaluation Report on the M430A1 40MM Cartridge," on the M430A1. In September 1996, IDA issued its final technical report, "Live Fire Test and Evaluation of the M430A1 40MM Cartridge," on the M430A1. The DOT&E LFT&E report and the IDA technical report were substantially identical except that DOT&E included an introduction and summary that provided an overall assessment of the live-fire test results. The IDA technical report commented on test adequacy and stated that the Army did not conduct the M430A1 live-fire test program in accordance with an approved LFT&E strategy, did not include any testing against realistic targets, and provided only marginally adequate data for the lethality assessment. The DOT&E in its LFT&E report concluded that the Army did not test the M430A1 40 millimeter cartridge against realistic targets; however, the available

Appendix G. Director, Operational Test and Evaluation, Live-Fire Test Reports to Congress

test data indicated that the M430A1 can meet its lethality requirements. The DOT&E released its LFT&E report about 3 months before IDA released its technical report. When we asked the IDA project manager about the reason for the delay in releasing the report, he stated that, once DOT&E releases its report, its release takes the urgency out of IDA releasing its technical report. Consequently, DOT&E paid for publication and distribution of two M430A1 reports that were substantially identical.

In May 1995, the Army Materiel Systems Analysis Activity released its evaluation report, "Live Fire Test and Evaluation for Caliber .50 Saboted Light Armor Penetrator (SLAP) Ammunition," to DOT&E. On September 26, 1995, DOT&E issued its LFT&E report, "Live Fire Test and Evaluation of the 0.50 Caliber M903 Saboted Light Armor Penetrator (SLAP) Ammunition," to Congress. The IDA did not prepare a technical report for the M903 live-fire assessment and evaluation because the IDA analysts responsible for the technical report did not have time to prepare the report.

Appendix H. Description of Major Defense Systems Reviewed

Department of the Army

Command and Control Vehicle. The Command and Control Vehicle is an Acquisition Category II program that replaces the M557 command and control vehicle in the armored and mechanized infantry units. The Command and Control Vehicle is mounted on a modified Bradley chassis that houses computers, communications equipment, and staff personnel.

M2A3 Bradley Fighting Vehicle. The M2A3 Bradley Fighting Vehicle is an Acquisition Category IC program that provides mobile protected transport of infantry, performs cavalry scout missions, provides support to dismounted infantry, and suppresses or defeats a wide spectrum of threat targets. The Bradley Fighting Vehicle system is an upgrade to the existing Bradley Fighting Vehicle.

MH-47E and MH-60K Special Operations Aircraft. The MH-47E Special Operations Aircraft is a derivative of the Boeing CH-47 Chinook helicopter. The MH-60K Special Operations Aircraft is a derivative of the Sikorsky UH-60 Black Hawk helicopter. This Acquisition Category II program provides all-weather covert infiltration and exfiltration of Army Special Operations personnel.

Sense and Destroy Armor. The Sense and Destroy Armor, an Acquisition Category IC program, is a smart submunition designed to attack self-propelled artillery. The Sense and Destroy Armor submunition is fired from a 155 millimeter howitzer, after which a parachute deploys to decelerate and rotate the submunition. In this mode, the submunition searches for targets with sensors and then fires an explosively formed penetrator at the target.

Wide Area Munition. The Wide Area Munition, an Acquisition Category II program, is an off-route, top-attack, anti-vehicular smart munition. The Wide Area Munition smart munition uses seismic and acoustic passive sensors to search, detect, and recognize moving targets within its kill radius. The Wide Area Munition smart munition then launches a munition toward the target using sensors to detect and engage the target with an explosively formed penetrator.

Department of the Navy

Air-to-Air Intercept Missile-9X Sidewinder. The Sidewinder, an Acquisition Category ID program, is the next-generation U.S. short-range air-to-air missile.

Appendix H. Description of Major Defense Systems Reviewed

In comparison to its counterparts, the Sidewinder missile is intended to have a larger operational envelope, better capability against enemy countermeasures, and more flexibility for the aircraft in launching the missile.

Arleigh Burke (DDG-51) Class Destroyer. The DDG-51 Class Destroyer, an Acquisition Category IC program, operates offensively and defensively in multi-threat environments. The DDG-51 destroyers operate as units of carrier battle and surface action groups and as lead combatants in support of replenishment and amphibious groups.

Joint Standoff Weapon (Baseline Version). The Joint Standoff Weapon, an Acquisition Category ID program, is an air-launched, inertially guided, surface attack, glide weapon system that delivers submunitions.

Department of the Air Force

B-2 Spirit. The B-2 Spirit, an Acquisition Category IC program, is a stealthy, long-range bomber; however, its primary mission has evolved from strategic nuclear to conventional nonnuclear operations.

C-130J Hercules. The C-130J Hercules, an Acquisition Category IC program, primarily performs intratheater airlift missions.

F-16 Close-Air Support Aircraft/Battlefield Air Interdiction. The F-16 aircraft, an Acquisition Category ID program, is a retrofit of 200 F-16C/D Block 40 aircraft for the Close-Air Support role.

F-22 Aircraft. The F-22 Aircraft, an Acquisition Category ID program, is to be an air superiority fighter aircraft that will replace the F-15 Eagle in the early 2000s.

Joint Air-to-Surface Standoff Missile. The Joint Air-to-Surface Standoff Missile, an Acquisition Category ID program, is to satisfy the requirements of the terminated Tri-Service Standoff Attack Missile Program for an air-delivered standoff weapon capable of attacking heavily defended, high-value targets.

Appendix I. Report Distribution

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition and Technology
 Director, Test, Systems Engineering and Evaluation
 Director, Defense Logistics Studies Information Exchange
Under Secretary of Defense (Comptroller)
 Deputy Chief Financial Officer
 Deputy Comptroller (Program/Budget)
 Internal Control Officer
Assistant Secretary of Defense (Public Affairs)
Director, Operational Test and Evaluation
 Deputy Director, Live Fire Test
Director, Administration and Management

Department of the Army

Assistant Secretary of the Army (Research, Development and Acquisition)
 Program Executive Officer, Ground Combat and Support Systems
Deputy Under Secretary of the Army (Operations Research)
Auditor General, Department of the Army
Commander, Army Operational Test and Evaluation Command
 Director, Evaluation Analysis Center
Commander, Army Tank-Automotive and Armaments Command
Commander, Army Test and Evaluation Command
 Commander, Army Aberdeen Test Center
Director, Army Research Laboratory

Department of the Navy

Assistant Secretary of the Navy (Financial Management and Comptroller)
Assistant Secretary of the Navy (Research, Development and Acquisition)
 Program Executive Officer, Surface Combatants/AEGIS Program Manager
 Program Executive Officer, Tactical Aircraft Programs
 Director, Acquisition Documentation
Auditor General, Department of Navy
Director, Navy Test and Evaluation and Technology Requirements
Superintendent, Naval Postgraduate School

Department of the Air Force

Assistant Secretary of the Air Force (Acquisition)
 Program Executive Officer, Fighters and Bombers
 Program Executive Officer, Weapons
Assistant Secretary of the Air Force (Financial Management and Comptroller)
Auditor General, Department of the Air Force
Director, Air Force Test and Evaluation Directorate
Director, Survivability and Vulnerability Information Analysis Center

Unified Command

Commander In Chief, Special Operations Command
 Special Operations Command Acquisition Executive
 Program Executive Officer, Maritime and Rotary Wing
 Technology Applications Program Office

Other Defense Organizations

Director, Defense Contract Audit Agency
Director, Defense Logistics Agency
Director, National Security Agency
 Inspector General, National Security Agency
Inspector General, Defense Intelligence Agency

Non-Defense Federal Organizations and Individuals

Office of Management and Budget
Technical Information Center, National Security and International Affairs Division,
 General Accounting Office

Chairman and ranking minority member of each of the following congressional
committees and subcommittees:

Senate Committee on Appropriations
Senate Subcommittee on Defense, Committee on Appropriations
Senate Committee on Armed Services
Senate Committee on Governmental Affairs
House Committee on Appropriations
House Subcommittee on National Security, Committee on Appropriations
House Committee on Government Reform and Oversight
House Subcommittee on Government Management, Information, and Technology,
 Committee on Government Reform and Oversight
House Subcommittee on National Security, International Affairs, and Criminal
 Justice, Committee on Government Reform and Oversight
House Committee on National Security
House Subcommittee on Military Research and Development, Committee on
 National Security

THIS PAGE INTENTIONALLY LEFT BLANK

Part III - Management Comments

Director, Operational Test and Evaluation, Comments



OPERATIONAL TEST
AND EVALUATION

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, DC 20301-1700

18 AUG 1997

MEMORANDUM FOR THE INSPECTOR GENERAL, DEPARTMENT OF DEFENSE

SUBJECT: Draft of a Proposed Audit Report on Live-Fire Test and Evaluation of Major Defense Systems

Thank you for the opportunity to review your draft audit report of the Live Fire Test and Evaluation of Major Defense Programs. I have completed my review and appreciate the efforts of the DoD IG team to address the program, its operation, and impact.

Before discussing the four specific findings presented in the draft, I would note that the overall conclusion of the team was that *"the Office of the Secretary of Defense and the Military Departments effectively implemented the LFT&E process from the programs reviewed,"* and we certainly agree. I am also pleased that the team pointed out that significant efficiencies have been brought about by the FASA-mandated move of the LFT&E program to this office. The move has, indeed, brought about not only economies of scale and more efficient management and reporting to the Secretary of Defense and to the Congress, but it has also brought about a much better integration of vulnerability/lethality issues with issues of concern to the OT&E community. The draft report also notes that the Live Fire Test and Evaluation Office has *"employed a number of creative innovations to improve awareness of the LFT&E process,"* something we will continue to pursue.

To keep my response brief, I will confine my comments to the four specific findings themselves and will not address the detailed comments made in the many pages of discussion.

Finding A. Live Fire Test and Evaluation Oversight List. Partially concur.

Maintenance of the OSD T&E Oversight List is a constant and recurring task and by DoD 5000 Regulation, must be updated at least annually. Determining candidacy of systems for T&E oversight inclusion is more difficult than it may first appear. Not only does one have to identify the potential candidates as they begin their acquisition journey, sufficient details need to be known about its anticipated usage to understand whether it will be expected to provide protection to the user, to know whether its total cost will exceed the dollar thresholds established for candidacy, or, if an upgrade which does not qualify as a new system due to its funding level, whether the upgrade would significantly affect the survivability or lethality of the system being upgraded.

The DoD 5000.2R gives specific responsibility to the Services to step forward and begin the process and identify potential systems which may qualify for LFT&E oversight. I agree that this responsibility has not been exercised uniformly within the Services. The same document also

explicitly gives the DOT&E the responsibility to approve LFT&E candidates for oversight. In practice, what has happened, as your draft report has concluded, is that the identification of LFT&E candidates, especially for ACAT II and below, has been less than efficient and we have had to rely on any number of sources to obtain information to identify potential candidates when the Services have not stepped forward with nominations themselves. I concur with your recommendation that the Services comply with current DoD regulations requiring the Services to nominate potential candidates for LFT&E consideration. I concur with your recommendation that the draft oversight list should be circulated to the Services for their review and comment prior to publication. I also concur with your recommendation that ACAT II and III program lists be provided to this office on a regular basis for review.

Finding B. Reporting Live-Fire Test and Evaluation Results. Partially concur. In response to the DoD IG draft report recommendation, I have removed the requirement from our renewal contract with the Institute of Defense Analyses (IDA) to have such an LFT&E technical report as a mandatory deliverable for every program.

One of the major deliverables required by statute is for the Director, Operational Test and Evaluation, to prepare the independent Live Fire Test and Evaluation Report for the Secretary and the four defense-related committees of the Congress. Hence, we place a heavy emphasis on how it is prepared, who helps in its preparation, its clarity and completeness and most of all, its accuracy and timeliness. IDA, since the inception of the Live Fire Test program over a decade ago, has been the exclusive support contractor in assisting the LFT&E office in its preparation of these reports. Since the beginning, these reports have been candid, comprehensive, and technically sound. With the move of the LFT&E mission to the DOT&E office, we have felt, as the Congress in its FASA legislation and your draft report both conclude, that considering LFT&E results in the context of OT&E results and OT&E results in the context of LFT&E makes a lot of sense. Hence, for those programs which require both a Beyond Low-Rate Initial Production OT&E Report as well as a Live Fire Test and Evaluation Report, we prepare and submit these two reports often under one cover, thereby enabling a more efficient, balanced, and complete assessment of the system under review. However, to enable the combined reports to be more concise and readable, a significant amount of technical material historically included in LFT&E Reports when they had been submitted alone, must be removed. This removed material, nevertheless, is critical to the overall conclusions drawn in the combined reports submitted to the Congress and should be retained for future reference.

The comment was made in the draft report that these technical reports are often published long after the LFT&E Report goes to the Congress. This is correct. There is no need for the technical report to be published prior to the congressional submission. The only requirement is that the technical work be performed to draw the correct conclusions prior to submission. The technical reports, which can be published on a less demanding schedule, contain vital information which should be retained for future use and reference, especially recognizing that an increasing share of systems on the oversight list are upgrades to current systems. This information will serve

as a vital baseline for comparison with future upgrade systems on oversight. As a result, we plan to maintain these files for future reference.

Finding C. Processing Requests for Waiver From Full-Up, System-Level Survivability or Lethality Tests. Concur. This finding is certainly appropriate and is an issue which we have wrestled with since the DoD 5000 was reissued nearly two years ago. The current confusion in the DoD 5000 series over how to obtain a waiver stems, in part, from a policy letter which was issued by the DepSecDef in 1995 prior to the reissuance of the DoD 5000 series. This letter was then translated into the DoD 5000 series and confused the process even more. I agree that the waiver process should be clarified and made consistent.

In response to this, we have recently published portions of our DOT&E Notebook which include these procedures. The waiver process is fully explained and is consistent. Following this, we plan to submit to the DoD 5000 Defense Acquisition Policy Working Group a revised regulation for consideration and inclusion.

Finding D. Strengthening Management Controls. Partially concur. As your study concluded, the *"LFT&E office has employed a number of creative innovations to improve awareness of the LFT&E process . . . has written a number of papers, conducted LFT&E educational conferences, and established an Internet website . . ."* Over and above this, we have also produced two educational videos, hundreds of copies of which are being used nationally to communicate what is expected in the LFT&E program. Furthermore, we wrote and published an LFT&E Users' Guide over eight years ago and circulated it widely as a training aid. This Users' Guide is being supplanted by the LFT&E website and the DOT&E Notebook together providing much more detail on how to plan and execute LFT&E than ever before.

It is also noteworthy that there is more descriptive material on Live Fire Testing in the DoD 5000 series of Directives and Regulations than for nearly any other subject, and certainly more than either developmental testing or operational testing. All of these aforementioned resources are also used to help train the LFT staff, including the one-year rotational trainees serving in the office who make up a significant portion of the LFT&E workforce. Hence, I can only partially concur with the finding that LFT&E administrative policies and procedures are not well-known and established.

In response to your recommendations, we will review LFT&E administrative procedures relating to the documentation and support of conclusions and recommendations made for LFT&E program oversight. Also, in response to the recommendations of your draft report, we have already accelerated the completion of our DOT&E Notebook. In fact, the full integration of LFT&E policy and procedures has already been completed in draft and should be published in advance of September 30, the date recommend in your draft report.

Director, Operational Test and Evaluation, Comments

I must note that we are taking all these actions (in addition to the regular day-to-day demands on the LFT&E Office) in an office which has only five full-time professionals.

In conclusion, I again want to commend the DoD IG team for a professional and thorough job on this study. The entire defense community will benefit from their efforts.



Philip E. Coyle
Director

Director, Test, Systems Engineering and Evaluation, Comments



OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON
WASHINGTON DC 20301-3000

22 AUG 1997

MEMORANDUM FOR OFFICE OF THE INSPECTOR GENERAL

FROM: DIRECTOR, TEST SYSTEMS ENGINEERING, AND EVALUATION

SUBJECT: Review of the Draft DODIG Audit Report, "Live-Fire Test and Evaluation of Major Defense Systems", (Project No. 6AE-0067.00), June 18, 1997

This office has reviewed the subject draft report and provides the following comments:

- **Finding A.** Concur with the recommended improvements in developing the OSD Test and Evaluation Oversight List.
- **Finding B.** Partially concur with this finding which recommends the termination of formal LFT&E technical reports prepared by the Institute for Defense Analyses (IDA) since the results are included in DOT&E's Beyond LRIP Reports to Congress. However, it is our view that the DOT&E should have the flexibility to direct the preparation of separate technical reports, when they appear to have some future value. This is especially true given the trend to use past test data to the greatest degree possible to reduce the costs of future tests. These reports include the unbiased, technical analyses which are used by the DOT&E action officers in producing the Live Fire "Evaluation", which may include more than just the technical analysis.
- **Finding C.** Concur with the recommendation to revise DODR 5000.2-R to describe a consistent LFT&E waiver process. On page 20, the report states that the OASN(RDA) believed that waivers could not be submitted after a program passed MS II, implying that this was a misunderstanding of sec. 2366 by OASN. However, the report does not clarify that implied misperception. Was this not, in fact, a correct interpretation by OASN?
- **Finding D.** No comments are provided on the recommendations concerning DOT&E's LFT&E internal administrative policies.

DTSE&E's Point of contact for these actions is Mr. Richard Ledesma, (703) 695-4421.

Patricia Sanders
Director, Test, Systems
Engineering and Evaluation



Department of the Army Comments



DEPARTMENT OF THE ARMY
DEPUTY UNDER SECRETARY OF THE ARMY
OPERATIONS RESEARCH
102 ARMY PENTAGON
WASHINGTON DC 20310-0102

SAUS-OR

22 AUG 1997

MEMORANDUM FOR INSPECTOR GENERAL, DEPARTMENT OF
DEFENSE (ATTN: ACQUISITION MANAGEMENT)

SUBJECT: Audit Report on Live-Fire Test and Evaluation of Major Defense
Systems (Project No. 6AE-0067.00)

The Department of the Army concurs with the findings and recommendations of the subject report. Recommendation A.1 calls for the Deputy Under Secretary of the Army (Operations Research) and appropriate offices of other services to "formally document and recommend candidate programs to the Director, Operational Test and Evaluation, for LFT&E oversight." The Army will join in whatever procedure the DOT&E establishes for this action.

A handwritten signature in cursive script, reading "Walter W. Hollis".

Walter W. Hollis
Deputy Under Secretary of the Army
(Operations Research)

Printed on Recycled Paper

Department of the Air Force Comments



Office of the Assistant Secretary

DEPARTMENT OF THE AIR FORCE
WASHINGTON, DC

14 AUG 1997

MEMORANDUM FOR ASSISTANT INSPECTOR GENERAL FOR AUDITING
OFFICE OF THE INSPECTOR GENERAL
DEPARTMENT OF DEFENSE

FROM: SAF/AQ
1060 Air Force Pentagon
Washington DC 20330-1060

SUBJECT: "Live-Fire Test and Evaluation of Major Defense Systems," June 18, 1997, Project
No. 6AE-0067.00

1. This is in reply to your memorandum requesting the Assistant Secretary of the Air Force (Financial Management and Comptroller) to provide Air Force comments on subject report. We have the following comments and recommendations:

Recommendation A.1. "... formally document and recommend candidate programs to the Director, Operational Test and Oversight, for LFT&E oversight." Response: Concur. Although AFI 99-105 provides guidance and procedures for the LFT&E of Air Force systems, the document does not provide the specific guidance on the "when, how, and who" of identifying candidate programs. AF/TEP and SAF/AQX will update this document to provide the specific guidance required to systematically document and recommend our candidate programs. The estimated completion date for this update is Apr 98.

Recommendation C.2. "... F-22 program is required to submit a request for waiver from full-up, system-level survivability testing by 30 Sep 97." Response: Concur. We intend to meet the 30 Sep 97 submittal date.

Comment: On page 50, your description of the B-2 bomber should be corrected for accuracy. The description should read: The B-2 Spirit, an Acquisition Category IC program, is a stealthy, long-range bomber; however, its primary mission has evolved from strategic nuclear to conventional nonnuclear operations.

2. In addition to my comments listed above, AF/TE has additional comments (Atch 1) that I'm forwarding to you in their entirety.

3. The point of contact for further questions on this review from our office is Maj Daniels, 697-7505, e-mail address danielsj@af.pentagon.mil.

Attachment:
AF/TE Comments

George K. Muller
GEORGE K. MULLER, Lt Gen, USAF
Principal Deputy, Assistant Secretary
of the Air Force (Acquisition)



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE



14 AUG 1997

MEMORANDUM FOR ASSISTANT INSPECTOR GENERAL FOR AUDITING
OFFICE OF THE INSPECTOR GENERAL
DEPARTMENT OF DEFENSE

FROM: HQ USAF/TE
1650 Air Force Pentagon
Washington, DC 20330-1650

SUBJECT: DoDIG Draft Report, Live Fire Test and Evaluation of Major Defense
Systems, (Project 6AE-0067.00)

This is in reply to your memorandum requesting the Assistant Secretary of the
Air Force (Financial Management and Comptroller) to provide Air Force comments
on subject report. We have the following comments and recommendations:

Finding A: Live Fire Test and Evaluation Oversight List

a. We non-concur with recommendation A.2.a which suggests using
ACAT III program lists to help identify candidate covered systems subject to LFT&E
and DOT&E oversight. We do not believe a review of ACAT III program lists will aid
the search for candidate LFT&E systems covered by Title 10 section 2366. However,
we concur with the use of ACAT II lists. RATIONALE: Title 10 describes which
programs are subject to LFT&E, and specifically targets ACAT I and ACAT II
programs. According to the definition "covered system" in §2366(e)(1), and the
definition of "major system" in section 2302(5), only ACAT I and II programs are
covered. ACAT III programs are not potential LFT&E candidates, nor are they
subject to OSD LFT&E oversight.

b. We concur with Recommendations A.1, A.2.b, and A.3.

Finding B: Reporting Live Fire Test and Evaluation Results

a. On page 13, the draft makes reference to a "DOT&E independent report
to Congress." According to Title 10 section 2366(d), the Secretary of Defense, not the
DOT&E, submits the LFT&E report to Congress. Independent reporting from
DOT&E is only required for initial operational test and evaluation (IOT&E)
described in section 2399, but is not required for LFT&E reports in section 2366. By
combining the LFT&E and OT&E reports, and sending both directly to Congress
without intervening SECDEF review, the SECDEF's control over the LFT&E report's
contents before submission is compromised.

Page 15

Final Report
Reference

Page 23

b. We non-concur with recommendation to finding B. The BLRIP report and the LFT&E report must remain separate to ensure the SECDEF can exercise his authority to edit the LFT&E report before it is submitted by the SECDEF to Congress (as mandated in Section 2386).

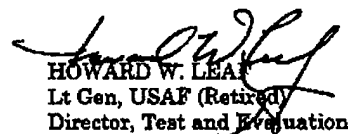
Finding C. Processing Requests for Waiver from Full-Up, System-Level Survivability or Lethality Tests

a. On page 20, first full paragraph, the report presumes the DDG-51 is subject to LFT&E despite the determination by the Office of the Assistant Secretary of the Navy (RD&A) that the system was not a covered system. The paragraph should be rephrased to make clear that this is the opinion of the DoDIG only. RATIONALE: The statement is incorrect. The issue of which systems are subject to LFT&E (e.g., are "covered systems") is currently being debated among senior DoD leaders. A number of other systems besides the DDG-51, such as the C-130J aircraft, and the CH-47D and UH-60L helicopters, are potentially impacted by the outcome of those discussions. DoD 5000.2-R, Appendix IV, concedes the difficulty of resolving this issue when it states, "Legal counsel should be consulted to verify the final determination of program status." In short, simple generalizations about the covered status of systems is misleading. In the C-130J's case, the Air Force asked the OSD General Counsel (OSD/GC) for their opinion about the covered status of the C-130J, and OSD/GC said the law may not apply to the C-130J program.

b. We non-concur with recommendation C1. Unless the DDG-51 destroyer is identified as a covered system, a waiver to the statute is not required. We concur with recommendations C2 and C3.

Finding D. Strengthening Management Controls. We concur with the recommendations.

Additional minor comments on the draft report are attached. My points of contact are Maj Bo Tye and Mr. Chuck Triaka, (703) 696-0900, and fax (703) 696-0803.


HOWARD W. LEAF
Lt Gen, USAF (Retired)
Director, Test and Evaluation

Attachment:
Additional Comments

SPECIFIC COMMENTS

on the

DoDIG's REPORT ON LIVE FIRE TEST & EVALUATION (LFT&E)

- Beginning on page 2, second paragraph, and throughout the report: The report uses the wrong terminology when describing the types of systems covered by Title 10 section 2366. The term "major system" should be used instead of "major Defense system." RATIONALE: Section 2366 addresses only "major systems."

- On page 3, the draft report applauds DOT&E for its innovative use of "an internet website to inform individuals involved in LFT&E about the latest LFT&E advances, guidance, and issues." In the same vein, the DoDIG's report should recommend that DOT&E put their LFT&E Oversight List on that website for review and comment before the list is officially published.

- Page 9, second paragraph: Delete the statement about the SECDEF being "in the process of revising DoD Regulation 5000.2-R to require commercial items, including commercial off-the-shelf items, nondevelopmental items, and advanced concept technology demonstrators or prototypes that meet the definition of a covered system or major munitions program to be subject to LFT&E." RATIONALE: This change has been withdrawn.

- Page 14, in the C-17 subparagraph: Recommend adding the following sentence to the report: "Despite several requests, IDA's technical report on C-17 LFT&E has not been released to the Air Force for review, nearly two years after the Oct 95 Defense Acquisition Board decision to proceed beyond LRIP. This report may contain valuable lessons learned which could help improve other Air Force programs."

- Page 33, last paragraph: The text mistakenly states that the Federal Acquisition Streamlining Act (FASA) "placed LFT&E under DOT&E." FASA only added a provision to Title 10 section 139 requiring the Director to "monitor and review the live fire testing activities of the Department of Defense provided for under section 2366." It was the DoD who moved the LFT&E office and personnel from OSD/DTSE&E to OSD/DOT&E.

- Page 44, paragraph 2: The text contains some errors regarding the extent of DOT&E's responsibilities for LFT&E as directed in FASA and Title 10. The draft states "DOT&E accomplishes its oversight responsibilities by reviewing and approving live fire documents . . ." More correctly, Title 10 section 139(b)(6) only gives the Director authority to "monitor and review the live fire testing activities" of the DoD. (italics added) In line 7, DOT&E's authority extends only to approving the LFT&E strategy and not the LFT&E plans. Finally, change the

Attachment 1

Page 10
Revised

Page 16

Page 37
Revised

Page 53

Department of the Air Force Comments

Final Report Reference

Revised

last sentence to read, "If DOT&E oversees the live fire test and evaluation of a program . . ." DOT&E does not ~~conduct~~ LFT&E because they do not have the specialized assets or personnel for this kind of work.

Appendix
Added

- Include a verbatim copy of §2386 as an appendix to the report. RATIONALE: The reader should have the actual law available for reference due to the complexity of the issues.

Audit Team Members

The Acquisition Management Directorate, Office of the Assistant Inspector General for Auditing, DoD, prepared this report.

Patricia A. Brannin
John E. Meling
Jack D. Snider
John J. Dzik
Neal J. Gause
Susan J. Lippolis
Debra A. Calhoun
Linda C. Servais
Krista P. Gordon

INTERNET DOCUMENT INFORMATION FORM

A . Report Title: Live-Fire Test and Evaluation of Major Defense Systems

B. DATE Report Downloaded From the Internet: 10/11/99

C. Report's Point of Contact: (Name, Organization, Address, Office Symbol, & Ph #): OAIG-AUD (ATTN: AFTS Audit Suggestions)
Inspector General, Department of Defense
400 Army Navy Drive (Room 801)
Arlington, VA 22202-2884

D. Currently Applicable Classification Level: Unclassified

E. Distribution Statement A: Approved for Public Release

F. The foregoing information was compiled and provided by:
DTIC-OCA, Initials: __VM__ Preparation Date 10/11/99

The foregoing information should exactly correspond to the Title, Report Number, and the Date on the accompanying report document. If there are mismatches, or other questions, contact the above OCA Representative for resolution.

19991012 170